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WORLD DEMAND PROSPECTS FOR WHEAT

IN 1980

1980

ABSTRACT

Four basic sets of projected wheat production, availability, trade, and export earnings of major world regions are presented in the study, centered around 1980. Historical analysis and data support the projections, which take into account the "Green Revolution." The projections imply the following: Concerted effort of the less developed countries to produce exportable supplies of wheat would encounter declining world market prices. There may be countries within regions such as North Africa and West Asia where efforts might be stepped up to enhance the domestic production of wheat. The demand for wheat in many nonproducing countries is expected to expand rapidly, and imports will be necessary if this demand is to be met. There is an implied need for continued concessional export transactions and some form of aid, especially to regions where foreseeable wheat technology precludes increased production. More wheat may be used for feed than the projections imply. Nutritional levels on a calorie basis will be improved. Trade policy objectives of less developed countries may be conflicting. For instance, lower world prices would benefit importers but would also adversely affect earnings of the exporters. Competition in world grain trade will remain very keen.

Key words: World wheat supply, World wheat demand, Projections, Foreign trade.

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Results of the project of which this report is a part have been published as follows by the Economic Research Service:

World Trade in Selected Agricultural Commodities, 1959-65

    Vol.   I.--Beverage Crops: Coffee, Cocoa, and Tea. Foreign Agr. Econ. Rpt. 42,
                June 1968.
    Vol.   II.--Food and Feed Grains: Wheat, Rice, Maize, Barley, and Other Cereals.
                Foreign Agr. Econ. Rpt., June 1968
    Vol. III.--Textile Fibers: Cotton, Jute, and Other Vegetable Fibers. Foreign
                Agr. Econ. Rpt. 543, June 1968.
    Vol. IV.--Sugar, Fruits, and Vegetables. Foreign Agr. Econ. Rpt. 44,
                June 1968.
    Vol.   V.--Oilseeds, Oil Nuts, and Animal and Vegetable Oils. Foreign Agr.
                Econ. Rpt. 47, Aug. 1968.

  Japan's Food Demand and 1985 Grain Import Prospects. Foreign Agr. Econ. Rpt. 53,
    June 1969.

  World Demand Prospects for Agricultural Exports of Less Developed Countries.
    Foreign Agr. Econ. Rpt. 60, June 1970.

  World Demand Prospects for Wheat in 1980 with Emphasis on Trade by Less Developed
    Countries. Foreign Agr. Econ. Rpt. 62 , June 1970.

  Growth in World Demand for Feed Grains: Related to Meat and Livestock Products and
    Human Consumption of Grains, 1980. Foreign Econ. Rpt. 63 , June 1970.

Copies of these reports may be obtained upon request to the Division of Information, Office of Management Services, U.S. Department of Agriculture, Washington, D.C. 20250.

Additional reports are being developed on the following as part of the overall research project: World demand prospects in 1980 for rice; total grain; cotton; oilseed and meal; citrus fruits; coffee, tea, and cocoa; and bananas; the Japanese grain-livestock economy; and world agricultural import barriers. Publication of these reports will be announced.

FOREWORD

This study is part of a research project on "Demand Prospects for Agricultural Products of Less Developed Countries" conducted by the Economic Research Service under a participating agency service agreement for the Agency for International Development. Research under this project was carried out in three phases: Phase A, a historical analysis of agricultural exports of less developed countries; phase B, an analysis of demand prospects for selected agricultural products in importing countries; and phase C, an anlysis of policy implications of these estimated world demand prospects for export earnings from selected agricultural products in less developed countries.

This report is one of a series publishing results of the research project on demand prospects for selected agricultural commodities. These commodities include, in addition to wheat, rice, feed grains, cotton, oilseeds and products, coffee, cocoa, tea, bananas, citrus fruits, and selected vegetable crops. Published earlier were separate reports on international trade in these commodities and a report on their world demand prospects.

Wheat is by far the most widely traded food internationally. It is also the most highly commercial grain in the world, with about one-sixth of the crop in recent years moving into international trade. Increasing world consumption, especially in less developed areas has resulted in an expansion of world wheat trade. Consumption is expected to continue to increase, particularly in less developed regions, with the successful introduction of the semidwarf varieties--a development sometimes paraphrased as the "Green Revolution." This report considers these changes in dealing with the total world wheat economy. Its main objective is to estimate the long-term outlook for world wheat trade with emphasis on less developed countries. In doing so, it evaluates potential demand and trade levels in 1980 under several alternatives and discusses their implication for less developed countries.

Research on the demand prospects for agricultural exports of less developed countries was conducted under the direction of an ERS Technical Advisory Committee consisting of Louis F. Herrmann, Chairman, and Arthur B. Mackie and Anthony S. Rojko, who served as advisors and research leaders.

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Washington, D.C. 20250   July 1970

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SUMMARY

I would have fed them with the finest
wheat flour... --Psalm 81:17

The projections of this study have far-reaching implications for the less developed
countries (LDC's) of the world. Given this report's projected world supply and demand
conditions for wheat, the following are the conclusions most evident:

Concerted effort of the LDC's to produce exportable supplies of
wheat would encounter declining world market prices.

There may be countries within some regions, such as North Africa
and West Asia, where increased domestic production of wheat would be
absorbed by internal demand.

The demand for wheat in many nonproducing countries is expected
to expand rapidly and increased imports will be necessary to meet
this demand.

There is an implied need for continued concessional export trans-
actions and some form of aid, especially to those regions where
present and foreseeable wheat technology precludes increased wheat
production.

More wheat may be used for feed purposes than the projections
imply.

Nutritional levels on a calorie basis will be improved.

The LDC's include both importing and exporting countries,
making it difficult for them to achieve among themselves a con-
census on policy objectives. Lower world prices would benefit im-
porters but would also adversely affect earning of the exporters.

Competition in world grain trade will remain very keen.

These conclusions are based on four basic projection sets presented in this study.
The first set is an unbalanced world trade-constant price (1964-66) projection using
income, population, and trend as major determinants of supply and demand. The other
three sets (I, II, and III) were made with an econometric model designed to determine
equilibrium supply and demand quantities and prices given a certain level of factors
such as population, income tastes, and technology. The latter three sets assume that
the United States, Canada, and Australia will adjust their supplies to maintain buoyant
world trade prices. These three sets differ with respect to production functions for
less developed countries. Set I is based on continuing policies and includes the
impact of the "Green Revolution." Set II's production level is higher; and set III's
is lower. Sets I and II have subsets which are based on an assumption that the United
States, Canada, and Australia take whatever action necessary to maintain a share of
the export market.

The unbalanced world trade projections (set I) generally reflect a continuation of
the current world wheat economy--abundant supplies and slackening growth of import de-
mand. Aggregating regional projections to world totals results in a large trade im-
balance of about 22 million tons, exports exceeding imports. Price or policy adjust-
ments would have to be made to bring exports and imports into balance.

One of the most pronounced changes for the unbalanced world trade projections is a 90-percent increase in wheat output in the LDC's, primarily in South Asia. Production of the major suppliers increases only 14 percent, reflecting their position of managing supplies. Consumption is strong in the LDC's, increasing 73 percent; but it is sluggish in the developed area, rising only 15 percent. One of the surprises of the set I projections is a 45-percent increase in the net imports of the LDC's.

When LDC production is based on a higher production level (set II in this report), there is a striking change in trade. Import costs of the LDC's are down sharply, as South Asia shifts from a net importer position to a net exporter of about 7 million tons. Exports from the major suppliers are down nearly 8 million tons, with the United States and Canada accounting for most of the decline. World trade prices also decline as a result of the expanded wheat supplies under set II.

If the major exporters were to push for their traditional share of the market, world wheat supplies would be expanded and prices would drop precipitously. Import costs for the LDC's would decrease substantially, reflecting lower trade prices, but so would the export earnings of Argentina and South Asia.

If the "Green Revolution" is short-lived and output growth is decreased as under projections in set III, the volume of net imports of the LDC's would be up sharply from the level in set I. Trade prices would also rise with lower world supplies of wheat. This price rise coupled with larger imports would cause import costs for less developed countries to soar.

WORLD DEMAND PROSPECTS FOR WHEAT IN 1980
With Emphasis on Trade by Less Developed Countries

by

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I.--INTRODUCTION

Objectives

The overall objective of this study is to estimate the long-term prospects and implications for world wheat trade. This analysis provides part of the necessary framework for an assessment of the total grain trade market. It also indicates for the less developed countries, the probable magnitude of foreign exchange expenditures for or earnings from wheat.

Specific objectives of this study are:

1. To project the quantity of wheat and wheat flour
    demanded in the world and in selected regions in
    1980. 1/

2. To project the quantity of wheat produced in the
    world and in selected regions in 1980.

3. To project the quantity of world wheat trade in
    1980.

4. To estimate the costs of wheat imports by the LDC's
    in 1980.

5. To estimate the earnings of wheat exports by the
    LDC's in 1980.

Basic Definitions

The following terms are defined for the purposes of this study:

Units of Measurements

Metric units are used unless noted otherwise.

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1/ For the most part, wheat flour will be expressed in wheat equivalent and included with wheat.

1

Wheat Production

Production data used are published by the U.S. Department of Agriculture (USDA) in Indices of Agricultural Production (34, 35, 36, 37, 38). 2/

Wheat Trade

In most cases, wheat flour trade is included in wheat equivalents. In calculating availability, trade data as reported by countries on a July 1-June 30 trade year as published by the Food and Agriculture Organization (FAO) of the United Nations (101) or the International Wheat Council (100) were used.

The trade data used in chapter III, which provides a historical perspective, are on a calendar year basis and are based on (2).

Change in Stocks

Data on stocks were used in the computation of availabilities and were adjusted to a July 1 basis when possible. However, for most countries, stock data were not available and thus were not used in the computation of availabilities.

Area Harvested or Planted

Except where noted, area data refer to harvested area. Area data are generally consistent with the production data published in USDA agricultural production indices (34, 35, 36, 37, 38).

Yields

Average yields were computed by dividing wheat production by either the area harvested or the area seeded.

Availability

Production plus imports minus exports plus change in stocks (when available) equals availability. Thus, availability includes wheat used for food, feed, seed, waste, and industrial purposes. The terms "availability" and "consumption" are used interchangeably throughout the report.

Wheat Consumption Year

Production on a calendar year basis is added to July 1-June 30 trade. See figure 1 for details of sowing and harvesting seasons, and figure 2 for a diagram of how a consumption year is computed.

Unit Trade Prices

Unit import prices or unit export prices are obtained by dividing value data by quantity data from FAO trade yearbooks. Value data are given in c.i.f. (import) and f.o.b. (export) terms converted into U.S. dollars.

2/ Underscored numbers in parentheses refer to references listed at the end of this report under Literature Cited.

Regional Grouping

The world was divided into 22 regions (a few of which are individual countries alone), based on economic, political, and geographic criteria. These regions are listed below:

Major exporters
United States
Canada
Argentina
Australia and New Zealand

Developed importers
Japan
European Community (EC)--Belgium-Luxemburg, France, Germany (Federal Republic), Italy, Netherlands
United Kingdom
Other Western Europe--Austria, Denmark, Finland, Greece, Iceland, Ireland, Malta, Norway, Portugal, Spain, Sweden, Switzerland.
Republic of South Africa

Central plan countries
USSR
Eastern Europe--Albania, Bulgaria, Czechoslovakia, Germany (East), Hungary, Poland, Romania, Yugoslavia.
Communist Asia--Mainland China, Mongolia, North Korea, North Vietnam.

Less developed countries
Central America and Caribbean--British Honduras, Caribbean, including Cuba, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama.
East South America--Brazil, French Guiana, Guyana, Paraguay, Surinam, Uruguay, Venezuela.
West South America--Bolivia, Chile, Colombia, Ecuador, Peru.
North Africa--Algeria, UAR (Egypt), Libya, Morocco, Sudan, Tunisia.
West Africa--Angola, Cameroon, Central African Republic, Chad, Congo (Kinshasa), Congo (Brazzaville), Dahomey, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Portuguese Guinea, Senegal, Sierra Leone, Togo, Upper Volta, Other Portuguese West Africa.
East Africa--Botswana, Burundi, Ethiopia, Kenya, Lesotho, Malagasy, Malawi, Mauritius, Mozambique, Rhodesia, Rwanda, Somalia, Swaziland, Tanzania, Uganda, Zambia.
West Asia--Bahrein, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Muscat and Oman, Qatar, Saudi Arabia, South Yemen, Syria, Trucial States, Turkey, Yemen.
South Asia--Afghanistan, Bhutan, Ceylon, India, Nepal, Pakistan.
Southeast Asia--Burma, Cambodia, Laos, South Vietnam, Thailand.
East Asia and Pacific--Brunei, China (Taiwan), Hong Kong, Indonesia, Korea, Macao, Malaysia, Pacific Islands, Papua, Philippines, Singapore, New Guinea.

WHEAT SOWING AND HARVESTING SEASONS

| REGIONS | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. |

FALL SOWING   SPRING SOWING   HARVESTING
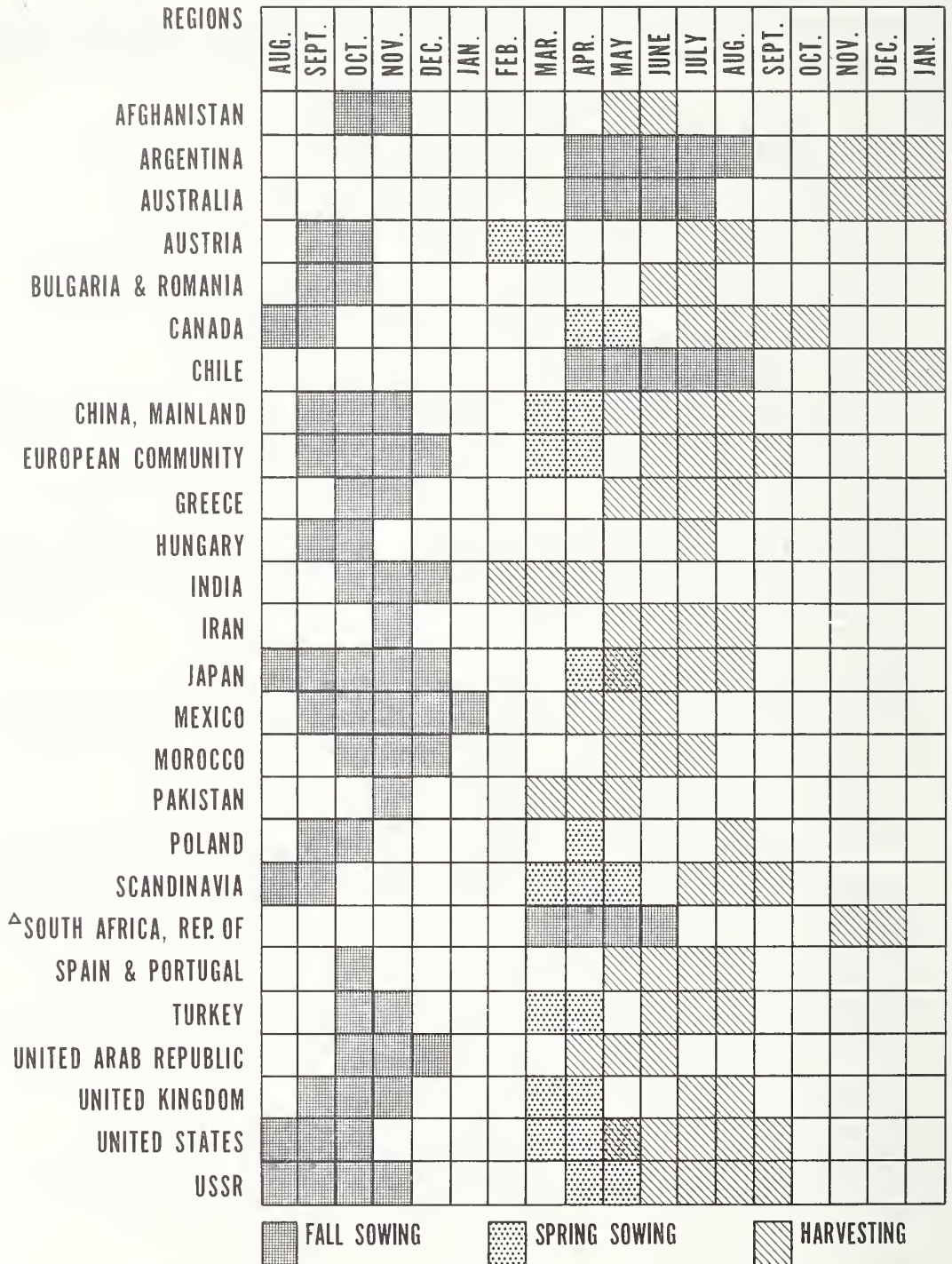
THE SEASONS BEGIN WITH THE FALL SOWING IN THE NORTHERN HEMISPHERE; THE TIME SPAN IS 18 MONTHS. THE ABOVE SCHEDULE
REPRESENTS THE MAJOR SOWING AND HARVESTING PERIODS ONLY. △ A SMALL AMOUNT OF SUMMER WHEAT IS ALSO GROWN BUT
IS RELATIVELY UNIMPORTANT. SOURCES: (10), (12), (14), (15), AND SELECTED REPORTS FROM U.S. AGRICULTURAL ATTACHES.

U.S. DEPARTMENT OF AGRICULTURE   NEG. ERS 7662-70 (5)   ECONOMIC RESEARCH SERVICE

Figure 1

4

THE JULY/JUNE WHEAT CONSUMPTION YEAR
Time References for Wheat Harvests, Stock Changes, and Trade

HARVEST
Northern Hemisphere

HARVEST
S. Hemisphere

STOCK CHANGES*

Production +
Stock changes*
+ Trade =
Consumption

TRADE

CONSUMPTION

JUL   JUN

FEB.   MAY   AUG.   NOV.   FEB.   MAY

**WHERE DATA ARE AVAILABLE.
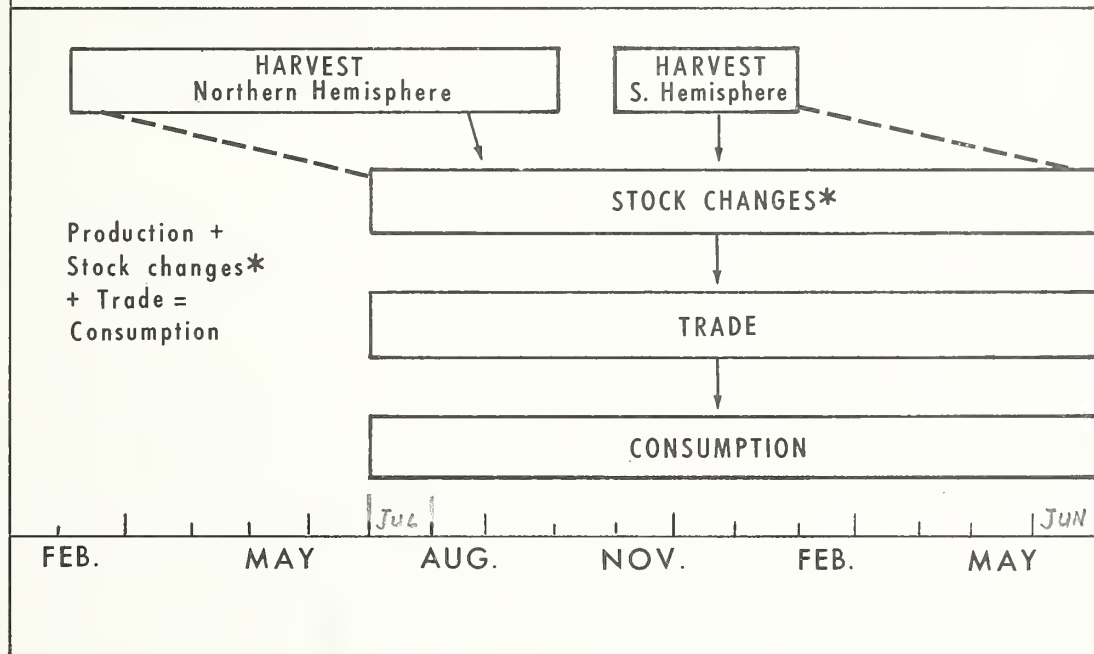
U.S. DEPARTMENT OF AGRICULTURE   NEG. ERS 7663-70 (5)   ECONOMIC RESEARCH SERVICE

Figure 2

II.--PRODUCTION: WHERE, HOW MUCH, AND WHY

> ...and he gave it for his opinion, that whoever could make two
> ears of corn /heads of wheat/, or two blades of grass, to grow
> upon a spot of ground where only one grew before, would deserve
> better of mankind, and do more essential service to his country,
> than the whole race of politicians put together. --Jonathan Swift
> in Gulliver's Travels

Production Pattern and Trends

World Production

Wheat accounts for 28 percent of world grain production, a percentage which has changed little during the past decade and a half (tables 1, 2). Coarse grain and rice account for 52 and 19 percent of total grain production, respectively.

World wheat production increased gradually during the past decade. Between 1955/56 and 1966/67, production of wheat ranged from a low of 200 million tons to a high of 285 million. Production averaged 216 million tons in 1955/56-1959/60 3/ and 250 million tons in 1962/63-1966/67, an increase of about 16 percent (tables 3, 4). About 29 percent of the increase was due to area expansion and 71 percent to yield improvements.

Production increased in each of the 22 regions except Japan, Communist Asia, and East South America.

Total area in wheat increased about 4 percent during the period, with the largest increase occurring in Australia. Area declined in the United States, the European Community, Other Western Europe, Japan, Eastern Europe, Communist Asia, North Africa, Central America, East South America, and West South America (table 3).

Yields generally increased in all regions (table 3). The world average rose from 1,100 kilos per hectare in 1957* to 1,220 kilos per hectare in 1964*, an increase of 11 percent. The larger increases occurred in Mexico, Eastern Europe, and the United Kingdom.

Central Plan Countries

The central plan countries (USSR, Eastern Europe, and Communist Asia) produced 35 to 45 percent of the world's wheat between 1955/56 and 1967/68 (table 7). Their share of total production declined slightly in this period. The USSR accounts for about half the region's production, with the remainder almost equally divided between Eastern Europe and Communist Asia. Yields in Eastern Europe are generally twice those of the USSR; yields in Communist Asia are slightly higher than the USSR's.

USSR.--The USSR is the largest wheat-producing country in the world. Between 1955/56 and 1967/68, its share of world production ranged from 18 to 30 percent. This compares with 21 to 31 percent produced by the four major exporters (United States,

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3/ 5-year averages are indicated by their midpoint and an asterisk hereafter in this chapter. 1957* represents an average for the period 1955/56 through 1959/60 and 1964* is the average for 1962/63 through 1966/67. See table 3 for a summary of each region and app. A for a larger, more detailed data series.

Canada, Australia, and Argentina). Russian wheat production increased 9 percent between 1957* and 1964*, which is lower than the rate for the early 1950's. About two-thirds of the increase in production was due to a 6-percent increase in area (1957*-1964*). Production and yields in the Soviet Union are especially subject to the vicissitudes of weather. Since the early 1960's, weather conditions have ranged from one extreme to the other, causing low yields in 1963/64 and 1965/66 and record high yields in 1966/67 and 1967/68.

Wheat production is generally larger than that of coarse grain and has increased more rapidly. Since 1955/56, production of coarse grain, principally barley and rye, has fluctuated around 50 million tons. Rice production in the Soviet Union is relatively small.

Eastern Europe.--All Eastern European countries produce wheat. The largest producers are Rumania and Yugoslavia; the smallest is East Germany. Wheat production in Eastern Europe increased almost 29 percent between 1957* and 1964*, even though area declined 1 percent. Yields increased over 30 percent, going from 1,490 kilos per hectare in 1957* to 1,950 kilos in 1964*.

Production of coarse grain is twice that of wheat, though it has not increased as rapidly. Corn is the major coarse grain, followed by rye, barley, and oats. Rice production is insignificant.

Communist Asia.--The 5-year averages for 1957* and 1964* for Communist Asia indicate the following decreases for wheat: production, 8 percent; area, 7 percent; and yields, 1 percent. The average for the recent period includes a record high production in 1964/65 and excludes a record low production in 1961/62.

Wheat accounts for about 16 percent of Communist Asia's total grain production, rice 46 percent, and coarse grain (largely corn and sorghum) for 38 percent.

Major Exporters

The United States, Canada, Australia, and Argentina, major producers and exporters of wheat, accounted for 21 to 31 percent of total world production between 1955/56 and 1967/68. 4/ Their share of world production increased over the period by about 3 percent. In 1964*, the United States, the largest producer of the four, accounted for 13 percent of the world's wheat, compared with 7 percent for Canada, 4 percent for Australia, and 3 percent for Argentina.

United States.--U.S. wheat production increased over 12 percent between 1957* and 1964*, with yields rising 16 percent and area declining 3 percent. The U.S. share of world production for these two 5-year periods dropped from 13.8 to 13.4 percent, the only decline among the four exporters. Also, the United States was the only major exporter for which wheat area declined, a result of Government production adjustment policies. However, U.S. yields increased more rapidly than those of the other three exporters.

Although wheat accounts for 20 percent of U.S. grain production, corn is the major grain produced; rice accounts for less than 2 percent of the total.

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4/ France and Russia may be considered as exporters also but are included in other broad categories for the purpose of this study.

Canada.--Canadian wheat production increased 45 percent between 1957* and 1964*, going from 5.9 to 7.3 percent of total world production. Two-thirds of the increase was due to area expansion and one-third to yield improvement. However, because area and production were higher for the early 1950's than for 1957*, the rate of increase-- based on 1957*--is higher than that based on the early 1950's.

Canadian wheat yields, which fluctuate widely with climatic conditions, increased 12 percent between 1957* and 1964*. The 1964* average yield of 1,590 kilos per hectare includes a record high yield.

Over half the grain produced in Canada is wheat. Barley and oats account for a third of grain production; corn production is relatively small (4 percent) but is in- creasing in size.

Argentina.--Wheat production in Argentina increased 22 percent between 1957* and 1964*, going from 2.8 to 3.0 percent of total world production. About one-fourth of the increase was due to expansion of wheat area and three-fourths to yield improvement. Yields averaged 1,310 kilos per hectare for 1957* and 1,520 kilos for 1964*. The latter average includes a record yield of 1,940 kilos in 1964/65 and an almost record low of 1,200 kilos in 1966/67.

Production of coarse grain, principally corn and sorghum, is generally larger than wheat. Rice production is insignificant relative to production of other grains.

Australia and New Zealand.--The region's 5/ wheat production doubled between 1957* and 1964*, going from 2.2 to 3.9 percent of world production. Expansion in wheat area accounted for over 80 percent of the increase. Yields fluctuate widely and are the lowest of those of the four major exporters, averaging 1,325 kilos per hectare for 1964*.

Wheat is the principal grain, accounting for over three-quarters of the region's grain production. Oats and barley are next in importance, followed by sorghum and corn. Rice production is relatively small.

Developed Importers

The developed importers produce 15 to 20 percent of the world's wheat. The European Community is the largest producer of the developed importers (over 60 percent of the group's total) followed by Other Western Europe (25 percent), the United Kingdom (8 percent), Japan, and South Africa.

EC.--Between 10 and 12 percent of the world's wheat is produced in the EC. France produces about half of this, Italy a third, and West Germany one-tenth. Area declined slightly between 1957* and 1964*, while yields increased 21 percent. Total production increased by 19 percent. Average yields in the region are second only to those in the United Kingdom.

Coarse grain production in the EC is larger than wheat production--31 million tons versus 24 million tons in 1964-66. Production increases for both wheat and coarse grain (25 percent corn) have been at about the same rate in recent years.

5/ Australia and New Zealand are included in 1 region for the purposes of the World Grain Model developed for the project of which this report is a part. New Zealand ac- counts for about 80,000 hectares and 250,000 tons of wheat annually. New Zealand wheat yields are 2 to 3 times those of Australia, but Australian production is so big that it dominates the region's statistics.

Other Western Europe.--About 4 percent of the world's wheat is produced in Other Western Europe. The major producers are Spain (46 percent), Greece (18 percent), and Sweden (9 percent). Between 1957* and 1964*, wheat production for the region increased 11 percent and yields, 14 percent; area declined 2 percent. Average yields in 1964* were 1,430 kilos per hectare, below those of the United States and Argentina, but slightly higher than Australia's. Among developed importers, yields were below levels in all regions except the Republic of South Africa.

Production of coarse grain is almost twice that of wheat, and has increased more rapidly than wheat production.

United Kingdom.--The United Kingdom produces 1.3 to 1.7 percent of the world's wheat. Production increased by one-third between 1957* and 1964*, while area increased slightly. Wheat yields in the United Kingdom, the highest for the 22 study regions, averaged 4,080 kilograms per hectare in 1964* and increased 25 percent between 1957* and 1964*. This is one of the largest increases to occur in the 22 regions.

Production of coarse grain, largely barley, is over twice as large as wheat production (7.8 million tons versus 3.7 million tons in 1964*) and has been increasing more rapidly than wheat production.

Republic of South Africa.--South African wheat production, 780,000 tons for 1964*, accounted for less than one-half percent of the world's total. Production increased 3 percent and seeded area 22 percent from 1957* to 1964*, while yields decreased. Even when considering yield on a harvested area basis there appears to have been no real improvement during the same period.

Production of coarse grain (largely corn) is much larger than wheat production--5 to 6 million tons versus 600,000 to 1 million tons.

Japan.--Production of wheat in Japan accounts for less than 1 percent of the world's total. Both area and production have declined in recent years, while yields have increased. Japanese wheat yields are among the highest in the world.

Production of coarse grain (mostly barley) is larger than wheat production, but has also been declining. Rice is the important crop of Japan. Its production is 15 to 16 times that of wheat.

Less Developed Importers

The less developed importers account for 13 to 17 percent of world wheat production. Their share of the total has not changed significantly in recent years. South Asia is the largest producer (over 40 percent of the group's total), followed by West Asia (over 30 percent) and North Africa (10 percent). Latin America excluding Argentina accounts for 10 to 12 percent.

South Asia.--The region accounts for 6 to 8 percent of world wheat production. India, Pakistan, and Afghanistan are the major wheat producers of the region. India produced 63 percent of the region's total, Pakistan 24 percent, and Afghanistan 13 percent. 6/ Between 1957* and 1964*, regional wheat production increased more than 18 percent despite the severe drought in 1965 in India and Pakistan. This increase is slightly above the world's average. Yields are low; however, the semidwarf wheats and associated new technology are rapidly improving them. (See section on semidwarf varieties, p. 19.) Record crops were harvested in 1968/69 and 1969/70.

6/ Averages for 1964*.

Rice is the major grain produced in this region, accounting for over one-half of total grain production. Wheat production accounts for less than one-third.

In India, between 1957* and 1964*, wheat production increased 23 percent, area 9 percent, and yields 12 percent. About 40 percent of the production increase was due to area expansion and 60 percent, to yield improvement.

Wheat accounts for about one-sixth of India's grain production. Rice production, on a milled basis, is three times as large. Even millet and sorghum production is larger than wheat production.

Pakistan's wheat production increased 16 percent between 1957* and 1964*. Wheat area increased almost 12 percent and yields, 4 percent. About three-quarters of the increase in production was due to area expansion.

Rice (milled basis) accounts for two-thirds of total grain production in Pakistan, and wheat for one-quarter. Coarse grains are relatively unimportant.

In Afghanistan, wheat production has fluctuated between 2 to 3 million tons in recent years, averaging 2,160,000 tons in 1964*.

West Asia.--About 5 percent of the world's wheat is produced in West Asia. Turkey is the major producer (60 percent), followed by Iran (23 percent), Syria (7 percent), and Iraq (6 percent). Between 1957* and 1964*, wheat production of the region increased 16 percent. About two-thirds of the increase was due to yield improvement and one-third, to area expansion.

Wheat accounts for 58 percent of total grain production; coarse grain (largely barley), 38 percent; and milled rice, 4 percent. Production of coarse grain has not increased as rapidly as wheat production in recent years.

North Africa.--Two percent of the world's wheat is produced in North Africa. The UAR is the largest producer (33 percent), followed by Morocco (25 percent), Algeria (25 percent), and Tunisia (10 percent). Regional wheat production increased 4 percent between 1957* and 1964*, with wide yearly fluctuations occurring during the period. Area and yields have also fluctuated widely from year to year, with area decreasing 4 percent and yields increasing 7 percent in the same period. Yields in North Africa are among the lowest of those in the 22 regions.

Wheat accounts for 35 percent of the region's grain production; coarse grain, 54 percent; and milled rice, 11 percent. Sudan produces primarily sorghum and millet. In Morocco, wheat production is as large as coarse grain production. UAR rice production is almost as large as wheat production while production of coarse grain is twice that of wheat. Algeria and Tunisia produce three to four times as much wheat as coarse grain.

Central America and Caribbean.--This largely tropical region is not ecologically suited for the production of present wheat varieties. Mexico is the only significant wheat producer, accounting for almost all of the region's output. Mexican wheat production increased almost 50 percent between 1957* and 1964*, while the area harvested declined over 14 percent. Practically all of Mexico's wheat is produced on irrigated land, and yields are relatively high. The large increase in yield (73 percent between 1957* and 1964*) is the result of the use of new semidwarf varieties and associated technology. These new varieties are spreading through those less developed countries where climate and management skill permit. 7/

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7/ For a complete discussion of the development of these varieties see p. 19.

Mexico also produces the major share of the region's coarse grain and rice. Production of coarse grain, largely corn and sorghum, is also growing rapidly and accounts for over 80 percent of total grain production in Mexico. Rice accounts for less than 2 percent of the total.

East South America.--Brazil and Uruguay are the only significant wheat producers in East South America. The other countries are not ecologically suited to wheat production with the currently available varieties. In 1964*, Uruguay produced almost twice as much wheat as Brazil. Regional wheat production declined between 1957* and 1964*. However, part of the decline indicated by production data on the region may not have actually occurred because the data for the middle and late 1950's are questionable and may be too high. Yields are among the lowest of those for the 22 regions.

Wheat production accounts for less than 5 percent of the region's grain production. Coarse grain, largely corn, accounts for over two-thirds, and milled rice, for over one-quarter.

West South America.--Over 75 percent of the wheat produced in West South America comes from Chile. Though the other countries produce some wheat, they do not have large areas suited for its production. Between 1957* and 1964*, wheat production of the region increased 9 percent; wheat area declined, but yields increased. Yields in the late 1960's approached those of Canada and Argentina.

About 30 percent of the grain produced in the region is wheat, and over one-half, coarse grain. In Chile, however, production of wheat is twice that of other grains. In the other countries, wheat production is small compared with production of other grains.

Other Less Developed Importers.--Wheat production in West Africa, East Africa, Southeast Asia, and East Asia is relatively small--primarily because of unsuitable growing conditions for present varieties. These regions account for less than one-half percent of world production. The major producers are Ethiopia, Kenya, Burma, Taiwan, and South Korea.

Classes of Wheat 8/

Wheat classes can be based on numerous factors: (1) Plant characteristics; (2) degree of hardness of the kernel; (3) color of kernel (dark, yellow, red, white); (4) time of sowing (fall or spring); (5) location of sown area; and (6) trade or commercial usage.

Two general systems are used in wheat classification. The first is primarily botanical--common, club, and durum; the second is mainly commercial--hard, soft, and durum. The botanical classification is based mainly on plant characteristics. The trade classification is based mainly on hardness, with protein content being the major criterion.

Botanical

Common.--This class belongs to the species Triticum aestivum. Its stem (culm) is usually hollow; the blades of the leaf are usually more narrow than is the case with other classes, and the head (spike) is long in proportion to its thickness. The kernel may be either soft or hard, and white or red.

8/ Much of the following sections on classes of wheat is taken from (87) and (13).

Common wheat is widely cultivated and is sown in either the fall or spring. It has more diverse characteristics than other classes. For instance, in the United States hard red spring includes dark northern spring, northern spring, and red spring, while hard red winter includes dark hard winter, hard winter, and yellow hard winter.

Club.--This class belongs to the species Triticum compactum. It is either fall or spring sown. The heads are generally club shaped and very compact. The kernels are small and either red or white. In general, club wheat can be distinguished from common by its shorter and denser spikes. Club wheat has a low protein content. Its flour is soft in texture, with weak strength and stability that makes it unfavorable for bread, unless blended with a stronger flour. It is chiefly used for products such as pastries, cakes, and pies.

Club wheat usually grows in climates with relatively abundant rainfall (averaging 40 inches) and mild winters. It is grown mainly in Western Europe, Australia, and the United States.

Durum.--This class belongs to the species Triticum durum and is quite distinct from the other classes. Presumably, it originated from emmer (a hard red wheat found in Russia and the Mediterranean area). The heads are compact and the kernels are usually long, slender, and pointed and either amber (white) or brownish red. 9/ The outstanding characteristic of the kernel is its hardness, which can be described as hard as flint. Most durum wheat is spring sown. It is resistant to rusts and smuts, except under excessive humid conditions. The best quality is produced under warm and dry conditions.

In certain regions of Europe and Russia, durum is referred to as hard wheat (sometimes called "macaroni wheat"). Durum is primarily processed into semolina flour, which is used for the manufacture of spaghetti, macaroni, and other pasta products.

Commercial

Hard and Medium Hard Wheat.--This class grows best in the medium temperate zone under fairly dry weather conditions. It has both winter and spring habits. The kernel is small and plump, and has a hard texture and a vitreous character. The protein content of the hard wheats ranges from 10 to 17 percent and the gluten is strong. The baking quality of the flour is very good for breads, including yeast breads, and hard rolls. Breads made from hard wheat normally have a longer "shelf-life" than those from soft wheats.

The United States, Canada, and the USSR are by far the largest hard wheat producers. Hard red winter accounts for nearly 60 percent of the total U.S. wheat area; production is concentrated in the States of Nebraska, Kansas, Colorado, Oklahoma, and New Mexico. Canada grows only a token amount of hard red winter in the Province of Alberta.

Hard red spring is Canada's major subclass, accounting for over 90 percent of total wheat output. It is grown in the western prairie Provinces of Manitoba, Saskatchewan, and Alberta. The Canadian spring wheats are graded under the trade name of Manitoba, which has been the quality wheat of long standing on the international market. Most of the hard red spring in the United States is produced in North Dakota, South Dakota, and Montana.

In the USSR, about two-thirds of the wheat area is sown to spring varieties. The hard winter wheat area takes in south European Russia, the Ukraine, and the North

9/ Red durum is not commercially important.

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Caucasus; the hard spring wheat region includes the middle Volga, the North Caucasus, the Ukraine, the Urals, and Siberia.

Australia produces a prime hard wheat containing 12 to 14 percent protein and a hard wheat containing 11 to 13 percent protein. However, these wheats account for only 8 percent of the wheat area. Production is concentrated in Queensland, New South Wales, and South Australia.

Mainland China also grows hard wheat extensively. Sizable amounts of hard red spring are produced south of the Yangtze River, in the far north, and in Mongolia. Elsewhere, hard winter wheat, either red or white, predominates.

Hard wheat is also grown in Western and Eastern Europe, Central India, North Africa, and other parts of the world.

In Australia and Argentina there are medium hard or semihard wheats that fall between the hard and soft classes, thereby earning the trade name "filler wheat." These wheats are often used for blending. The bulk of the Australian wheat output is known commercially as "fair average quality" (f.a.q.). These wheats, which normally range from 9 to 12 percent in protein, are produced throughout the Australian wheat belt. Argentina's medium hard wheat, known commercially as "Plate Wheat," is slightly stronger than Australian f.a.q. Its protein content averages about 12 to 13 percent. Argentina's wheat area is concentrated in four zones of the Pampa Region: Rosa Fe; Buenos Aires; Bahia-Blanca; and Entre Rios.

Soft Wheat.--This class is generally grown where winters are relatively mild and moisture is abundant. Most soft wheat is fall sown. Soft wheat yields are generally the highest of all classes. Protein content of soft wheat, however, is low--ranging approximately 6 to 11 percent--and a flour with weak strength and stability results. Hence, soft wheat flour, unless blended with stronger flour, is undesirable for breadmaking. It is chiefly used for products such as cakes, pastries, cookies, and crackers. World soft wheat production, excluding that of the USSR and Mainland China, approximates the output of hard wheat. Major growing areas are located in Europe, the United States, Australia, Asia, and Latin America. The EC accounts for about 40 percent of world soft wheat production.

The semidwarf varieties that were developed in Mexico (see p. 19) are soft wheats of relatively poor milling qualities. Breeding programs are now aimed at increasing their hardness and improving their milling quality.

Soft red winter is raised in the United States, mostly east of the Great Plains. The United States also produces white wheat, which is generally soft or semihard. About 85 percent of white wheat produced in the Western States comes from Washington, Oregon, and Idaho; Michigan and New York account for most of the white wheat in the East.

In Australia, soft wheat is produced in the Provinces of Victoria and in eastern West Australia. Other areas, such as India, Pakistan, Latin America, Africa, and Asia, grow a good deal of soft white winter and some soft red winter.

Durum.--The remaining commercial class is Triticum durum, which is the same as that in the botanical class.

Durum is produced widely over the world, with major areas in the United States, Canada, Argentina, the USSR, and the Mediterranean countries of Southern Europe and North Africa. U.S. durum production, which has been averaging between 1.5 and 2.0 million tons in recent years, is concentrated in North Dakota and neighboring States. Durum output in Canada is concentrated in Saskatchewan Province.

Durum output in the USSR, which once was the world's largest, has dropped to around 1.5 million tons. The durum area in the USSR extends from the Black Sea to the Western Ukraine and east of the Volga River and the Ural Mountains. Argentina's durum is grown chiefly in the Pampa area. Italy is the largest producer in the Mediterranean area, accounting for an average of 1.5-2.0 million tons per year; most of the durum is raised in southern Italy, including Sicily. In North Africa, a relatively small durum belt extends through Tunisia, Algeria, Libya, and Morocco; this area is normally a durum exporter.

Factors Affecting Wheat Production in Selected Regions

Many factors affect the level and location of wheat production. Some countries cannot grow present varieties of wheat because of unsuitable climate, and other countries have areas in which wheat is the most suitable crop to be grown. Given climatic factors and the present level of technology, and holding government policies constant, the major factors influencing changes in wheat production are changes in relative price levels, costs of production, and farmers preferences. Some price and cost impacts on production are discussed below.

Price

A single world price in a real sense may not exist. 10/ Prices of wheat differ widely among regions, at different market levels, and on a year-to-year basis. The variation is caused by differences in quality, class of wheat, supply and demand conditions, location, and government policies.

The supply price, or producer price, is the price farmers receive and use to develop their production plans. This price is hard to obtain on a regional level and is especially difficult to present on a common basis for regional comparisons. The difficulty is increased where government programs include other payments to wheat producers. Nevertheless, an attempt was made to develop a consistent producer price series for grains in each region. 11/

The lowest producer prices are generally in exporting regions, and the highest are in importing regions (table 8). This is to be expected since import prices include transportation costs, and importing regions tend to subsidize domestic production at relatively high levels to decrease their reliance on imports.

Producer prices in the major exporting countries of Canada, Australia, and Argentina declined in the early 1950's, then gradually increased through the 1960's (figs. 3-5). U.S. producer prices on the other hand generally declined in 1950 through 1968, with increases in 1962 and 1966. 12/ Prices in all major exporting countries declined in 1968 and 1969. Producer prices in many other countries generally rose between 1958/59 and 1966/67, as did wheat production in these countries. Higher import demands and a strong emphasis on "self-sufficiency" accounted for much of the increase in prices.

Canadian Price Impact.--To quantify the influence of wheat prices on Canadian wheat production, various regression analyses were run. It is usually assumed that

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10/ One can approximate world prices by averaging trade prices, c.i.f. or f.o.b. However, these must be converted to a common currency and problems arise here with which currency and exchange rates to use. 11/ Proxy prices for a region were used when data were unavailable. 12/ The U.S. price picture is clouded by changes that occurred in the U.S. wheat program in the 1960's, most notably in 1964. The high average price received by farmers in 1966 has not been repeated and cash prices for most classes declined in the 1950's and 1960's.

farmers base their production plans on expected price levels, given no change in other factors. It is also often assumed that recent price levels have the strongest influence on farmers' expectations. Therefore, farm prices were lagged 1 year to account for this.

Naturally, factors other than price affect production. Weather, for example, is very important. Stock levels, farmer expectations, and technological improvements are also important. An effort was made to quantify the impact of stocks and to net-out weather influences on production to better evaluate the coefficients used in the World Grain Model.

The regressions indicate both production and area are relatively responsive to price. Production price elasticities generally exceeded 1.0, indicating an elastic response to price (eqs. 1 and 2). Part of the high response of production to farm price changes may be due to the compounding effects of increasing yields, which may not be fully accounted for by the weather dummy variables or by the time variable acting as a proxy for improvements in technology. Improvements in technology may take place irrespective of price changes. Price elasticities for area are much lower than those for production, ranging around .3 to .5 (eqs. 4 and 5). The equations with stock levels as an additional variable give even lower elasticities, but the price coefficients do not differ significantly from zero (eqs. 3, 6, and 7).

Stock levels influence farmer expectations in at least two ways: (1) Stock levels influence price expectations and (2) in Canada, where major stocks are kept on the farm, high stock levels increase production costs to the farmer. The equations run which included stock levels indicated stocks influence production and area seeded. (See eqs. 3, 6, and 7.)

(1) BW = $-26.603 + 0.382\ PFW\text{-}1 - 0.097\ PFB\text{-}1 + 0.410\ PFO\text{-}1 + 0.162T$
  t values   1.3   0.3   1.6   0.7
  Elasticities   1.69 -0.35 1.37
  R^2 = .55   SE = 3.05   DW = 1.77

(2) BW = $-7.817 + 0.314\ PFW\text{-}1 + 3.397\ D1 - 3.225\ D2 + 0.140\ T$
  t values   3.1   3.7   2.1   1.1
  Elasticity   1.39
  R^2 = .82   SE = 1.93   DW = 2.64

(3) BW = $18.587 - 0.0369\ PFW\text{-}1 + 0.382\ D1 - 3.008\ D2 + 0.488\ T - 0.493\ S1$
  t values   0.21   3.54   2.33   2.66   2.32
  Elasticity -0.16
  R^2 = .88   SE = 1.65   DW = 2.10

(4) AW = $-1.207 + 0.488\ AW\text{-}1 + 0.072\ PFW\text{-}1 + 0.006\ PFB\text{-}1 + 0.020\ PFO\text{-}1 + 0.058\ T$
  t values   2.4   1.6   0.1   0.5   1.6
  Elasticities   0.49   0.46   0.03   0.09
  R^2 = .89   SE = 0.44   DW = 2.32

(5) AW = $7.803 + 0.525\ AW\text{-}1 + 0.081\ PFW\text{-}1 + 0.047\ T$
  t values   3.1   2.5   2.2
  Elasticities   0.25   0.51
  R^2 = .89   SE = 0.41   DW = 2.37

(6) AW = $4.450 + 0.482\ AW\text{-}1 + 0.020\ PFW\text{-}1 - 0.099\ S1 + 0.112\ T$
  t values   3.20   0.49   2.15   3.12
  Elasticity   .13
  R^2 = .92   SE = 0.361   DW = 2.51

(7) AW   = $8.198 + 0.605$ AW-1 $+ 0.023$ PFW-1 $- 0.063$ PFB-1 $- 0.015$ PFO-1 $- 0.117$ S1 $+ 0.112$ T
         t values   3.55   0.54   1.41   0.45   2.51   3.07
         Elasticity   .15
         $R^2 = .93$ SE = 0.358   DW = 2.94

Where the period covered was 1951/52-1966/67 and:

BW   = Canadian wheat production in millions of tons.

AW   = Canadian area seeded to wheat, in millions of hectares.

AW-1   = AW lagged 1 year.

PFW-1   = Farm price of wheat lagged one year, in current Canadian dollars per ton
           (final realized price of No. 3 Canadian Western 6-row barley, basis in store
           Ft. William/Port Arthur).

PFO-1   = Farm price of oats lagged 1 year, in current Canadian dollars per ton (final
           realized price per ton of No. 2 Western oats, basis in store Ft. William/ Pt.
           Arthur).

D1   = Dummy variable for good weather; one for good weather, zero otherwise.

D2   = Dummy variable for bad weather; one for bad weather, zero otherwise.

T   = Time with 1950/51 = 1.

S1   = Stocks on July 1 in millions of tons.

SE   = Standard error of estimate.

DW   = Durbin Watson statistic.

E   = Elasticity at the mean values.

t value = Student t test value.

   Argentine Price Impacts.--Regressions similar to those for Canada were run. The
results of these support the hypotheses that prices affect the amount of land devoted
to wheat and the level of production; that corn competes with wheat in some areas; and
that weather influences the amount of wheat area that is finally harvested. Wheat pro-
duction price elasticities are again higher than price elasticities for area.

(8) BW   = $3.322 + 0.150$ BW-1 $+ 1.040$ PFW-1 $- 0.745$ PFC-1 $+ 2.757$ D1 $- 1.670$ D2
         t value   0.95   2.2   2.1   3.6   1.8
         Elasticities   0.15   0.89   - 0.62
         $R^2 = .75$ SE = 1.189   DW = 1.89

(9) BW   = $4.582 + 0.844$ PFW-1 $- 0.689$ PFC-1 $+ 2.639$ D1 $- 1.665$ D2 $- 0.052$ T
         t values   1.3   1.7   3.4   1.7   0.6
         Elasticities   0.72   - 0.57   0.10   - 0.05
         $R^2 = .42$ SE = 1.22   DW = 1.70

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(10) AWS   =   3.075 + 0.184 AWS-1 + 0.398 PFW-1 - 0.356 PFC-1 + 0.018 PMW-1
     t values   0.8   1.5   2.1   1.3
     Elasticities   0.18   0.39   - 0.33   0.21
     R^2 = .42   SE = 0.651   DW = 1.80

(11) AWH   =   4.915 - 0.089 PFW-1 + 1.20 D1 - 0.066 D2
     t values   0.5   2.6   0.1
     Elasticities   -0.10
     R^2 = .37   SE = 0.777   DW = 2.18

Where the period covered was 1951/52-1966/67 and:

BW   = Argentina wheat production, December 1 year, in millions of tons.

BW-1   = BW lagged 1 year.

PFW-1   = Lagged farm price of wheat (domestic price of wheat, No. 1 and No. 2 Semi-
            hard, Buenos Aires, in pesos per ton deflated by the cost of living index;
            1962=100).

PFC-1   = Lagged farm price of corn (market price for yellow corn at Buenos Aires in
            pesos per ton deflated by the cost of living index (1962=100).

T   = Time; 1950/51 = 1.

D1   = Dummy variable for good weather; one for good weather, zero otherwise.

D2   = Dummy variable for bad weather; one for bad weather, zero otherwise.

AWS   = Area seeded to wheat in millions of hectares.

AWS-1   = AWS lagged 1 year.

AWH   = Area harvested of wheat in millions of hectares.

     Australia.--Wheat production in Australia has increased substantially in recent
years. The regressions run for Australia indicate, as expected, a positive influence
of price and time on both production and area. Stocks levels were not significant as a
determinant of production or area. Because of the rapid increase in production, the
equations probably give too much weight to price. Both area and production price
elasticities are highly elastic (eqs. 12 and 13).

(12) BW   =   -4.164 - 0.539 S2 + 0.155 PFW-1 + 0.286 T
     t values   0.94   1.18   3.73
     Elasticity   2.39   1.32
     R^2 = .67   SE = 1.54   DW = 2.39

(13) AW   =   - 5.304 + 0.132 S2 + 0.152 PFW-1 + 0.237 T
     t values   0.44   2.17   5.83
     Elasticity   1.53
     R^2 = .81   SE = 0.82   DW = 0.70

Where the period covered was 1950/51-1967/68 and:

BW   = Australian wheat production in millions of tons.

S2   = Australian wheat stocks on December 1 in millions of tons.

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PFW-1   = Australian wheat price lagged 1 year; average return to grower (bulk wheat) converted to U.S. dollars per ton.

T   = Time: 1950/51 = 1.

   Price Impacts in Other Regions.--Very little information is available on wheat price impacts on wheat production for the other regions. This is partly because wheat is heavily entwined in government policy in many regions. Government policies or weather often have a greater impact on production than do prices. Also, farmers, while responsive to increasing prices, are slow to respond to price decreases. Despite these limiting factors, a search of the literature was made. The supply price elasticities in table 9 are some of the more readily available.

   In addition, regression analyses were run for key countries. The equations used made wheat production a function of lagged producer prices and time. Other equations included a dummy variable for weather as an independent variable. The results of these equations are presented in table 10. For the regression using the weather variable, only the supply price elasticity is given. This is indicated by a W and is located directly below the other price elasticity. Very few of the regressions had coefficients that differed significantly from zero when tested at the usual probability levels.

Stock Changes

   As indicated above, stock levels and their changes can affect farmer expectations and production. An attempt was made to determine the effect of production and price on stock changes in Canada, Argentina, and Australia.

   Canada.--Stocks tend to increase with larger production and decline with higher export prices. The regressions support this expectation (see eq. 14). Canadian Government policies also tend to support this by trying to maintain a relatively stable price level, and by allowing farmers to deliver only specified quotas. Stocks are built up at times of large production and low prices. They are sold at times of lower production and higher prices. When stocks become too large, export prices may be lowered and delivery quotas tightened.

   Regressions were also run with the change in stocks--both on a July-June basis and on an August-July basis--as the dependent variable. The July-June change in stocks is more highly correlated with production and export price than is the August-July change in stocks.

(14) S1C $= 23.356 + 0.742$ BW $- 0.515$ PMW
    t values   4.62   2.20
      $R^2 = .67$ SE = 1.68   DW = 2.25

Where the period covered was 1951/52-1966/67 and:

S1C = Stock changes, July-June, in millions of tons.

BW   = Canadian wheat production, in millions of tons.

PMW = Export price of No. 1 Manitoba Northern at Ft. William/Pt. Arthur, in U.S. dollars per ton.

   Argentina.--In all equations tried for Argentina, both production and export prices have positive and generally significant coefficients. It is probable that price is not

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an important determinant of stock levels or stock changes in Argentina. The co-
efficients for price in the equations tend to support this. Otherwise, the authors
cannot explain the positive sign for export price.

Stock changes in Argentina at times can be quite large. Weather is an important
factor influencing stocks through its impact on production. Inclusion of data for all
years 1951 through 1967 provides a better fit than when the exceptional years of 1952
and 1965 are excluded.

(15) S2C   =   - 4.699 + 0.341 BW + 0.0385 PMW
     t values   3.18   2.28
        R^2 = .48   SE = 0.82   DW = 1.94

Where the period covered was 1950/51-1966/67 and:

S2C = Changes in Argentine December-November stocks in millions of tons.

BW   = Argentine wheat production in millions of tons.

PMW = Argentine wheat export price (August-July) f.o.b. of No. 1 Hard wheat, U.S.
       dollars per ton.

   Australia.--Australian stock changes are influenced by production. However, the
regression results indicate a positive price influence when a negative influence was
expected. Apparently, the rapid increases in production and the price control by the
Australian Government are enough to cause the unexpected signs for price. In a longer
run, prices must help reduce stock levels and higher prices must be associated with
negative stock changes.

(16) S2C   = - 7.691 + 0.351 BW - 1.552 D + 0.104 PMW
     t values   4.20   3.73   1.76
        R^2 = .73   SE = 0.47   DW = 2.01

Where the period covered is 1954/55-1967/68 and:

S2C = Australian wheat production in millions of tons.

D   = Dummy variable: 1955-60 = one; 1961-68 = zero; to account for an apparent
       shift in stock policies.

PMW = Australian Wheat Board selling price f.o.b. of f.a.q. bulk wheat at ports in
       U.S. dollars per ton.

Semidwarf Wheat Varieties in Less Developed Countries

   The recent production successes of the new semidwarf wheat varieties,[13] mostly
Norin 10 derivatives, in LDC's have been heralded as a major technological break-
through which, in part, may provide solutions to the food problem of less developed

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   [13] Many names have been used for the varieties under discussion, including Mexican
wheat, high yielding varieties (HYV), and semidwarf wheat. This study employs "semi-
dwarf wheat" for the most part. Semidwarfness generally refers to wheat less than 80
centimeters in height; dwarf wheat, in the pure sense, is a genetic anomaly; it is
only 10-15 centimeters in height and has no commercial value.

countries. By using new varieties (with increased applications of inputs), India produced 16.5 and 18.7 million tons of wheat in 1968 and 1969, respectively, against the previous high of 12.3 million in 1965 (table 11). Similarly, West Pakistan harvested 6.7 and 7.3 million tons in 1968 and 1969, compared with the previous high of 4.6 million in 1965 (table 12). Since 1965/66, the area sown to these new varieties in LDC's has increased rapidly, reaching 7.4 million hectares in the crop year 1968/69 (63).

The results of programs now taking place in many developing countries have been termed a "Green Revolution." The wide use of these wheat varieties following a major food crisis in India and Pakistan in late 1965 and 1966 was not a fortuitous occurrence. On the contrary, the development of these varieties followed a long and winding course, encompassing about 80 years 14/ and including research which involved many agricultural scientists and institutions.

Rockefeller Foundation

In 1941, three U.S. agricultural scientists 15/ visited Mexico for the Rockefeller Foundation to determine the feasibility of an agricultural project; they concluded that such a project was feasible (63).

To implement the program, the Mexican Government proposed a cooperative agricultural program under the Office of Special Studies in the Ministry of Agriculture. The proposal was accepted and the program to which the Foundation has extended financial and technical support began officially in 1942.

The project was organized along commodity lines, first with corn (Mexico's staple), and then wheat. Later, it included peas and beans, sorghum, forage crops, and livestock. Activities were carried out at the National College of Agriculture in Chapingo, 25 miles east of Mexico City, and at experiment stations throughout the country. The Office of Special Studies and other crop and livestock research agencies were consolidated into a single entity, the National Institute of Agricultural Research (INIA). It was chiefly staffed by Mexican scientists, with technical and financial assistance from the Foundation.

In 1963, the International Center for Corn and Wheat Improvement was formed to cooperate with the Foundation; it was operated by INIA and the Graduate School of the National College of Agriculture. In early 1966, the Center became the International Maize and Wheat Improvement Center (CIMMYT), with headquarters at Chapingo (17).

CIMMYT's chief research aim is the further development of superior seed stocks. Other important research projects include research on the use of chemical fertilizers, soil fertility, water and irrigation, plant protection, and plant physiology, along with agricultural economics and extension work.

The CIMMYT wheat program is being carried out in many countries, including India, West Pakistan, Turkey, Afghanistan, and Morocco. These countries also serve as a base for breeding stocks which are more adaptable to local conditions. Improvement programs in some countries have already reached a point where they now supply new varieties to the Mexican center.

14/ Although intensive research was initiated about 20 years ago, earlier efforts may be traced to the latter part of the 19th century (77).
15/ E.C. Stakman, University of Minnesota; Paul C. Mangelsdorf, Harvard University; and Richard Bradfield, Cornell University.

The conventional wheat research programs under CIMMYT's overall sponsorship include "triple dwarf varieties," 16/ "hybrid wheat," "spring/winter wheat," "new durum," and "triticales." 17/

Institutions in Other Countries

India set up the All India Coordinating Wheat Improvement Scheme to strengthen cooperation among Indian agencies conducting wheat research and development projects. Apart from massive imports of semidwarf wheat varieties from Mexico for immediate planting, a systematic testing program was created in nine centers and nine subcenters. Most of the breeding programs, crossing local wheats with the imported varieties, are conducted by the agricultural universities. Recently, India announced the development of one of the new semidwarf wheat varieties called "Kalyan 227," which has milling characteristics similar to the native varieties. It is a cross of an indigenous variety and an imported semidwarf wheat. Other new varieties also announced include PV-18, S-227, and S-309.

In West Pakistan, the Accelerated Wheat Improvement and Production Program was set up with the support of the Ford Foundation through a grant to CIMMYT. Imported semiswarf wheats are used to develop new varieties with better milling qualities. Indus 66 (a red wheat) and Mexipak 65 (a white wheat) are two of the most promising varieties developed.

In Turkey, under the direction of the Minister of Agriculture, wheat research has been completely reorganized. The Government hopes that a plant breeding center may be established in Turkey to assist the development of varietal research for the coast areas.

Turkey's agricultural extension service, with 1,800 members, along with other agencies, is working closely with farmers on the cultural practices for the new semidwarf wheat. The U.S. Agency for International Development (USAID) and Oregon State University are also providing technical assistance.

In Morocco, cooperation between research and extension is being improved through the Agronomic Research Division of the Ministry of Agriculture. These efforts will provide for the introduction of new semidwarf wheat which requires a special staff for inservice training and technical backstopping agents.

Semidwarf Wheat Development

The wheat improvement program in Mexico can be traced to the important roles of Japan and the United States. Sometime before 1892, two U.S. wheat varieties, Turkey Red and Fultz, were introduced to Japan. 18/ In 1917, Fultz was crossed with Daruma, a native variety.

In 1924, Fultz-Daruma was crossed with Turkey Red and in 1926, the second generation (F_2) was grown and selected. The selection, known as Tohoku No. 34, was named Norin 10 19/ and was released in 1935.

16/ Triple dwarf variety is the progeny of 3 separate semidwarf types of wheat (22).
17/ Strains derived from crosses between wheat and rye (104).
18/ Much of the information about wheat pedigree in Japan was extracted from (77).
19/ The word "Norin" is an acronym made up of the first letter of each word in the Romanized title of the Japanese Iwate-Ken Agricultural Experiment Station. The numerals, such as Norin 10 and 33, are selection numbers.

Its outstanding characteristics are: (1) a short, stiff straw which shows virtually no tendency to lodge or fall over; its height ranges from 55 centimeters to 80 centimeters, or about one-half to two-thirds the height of ordinary varieties; and (2) more tillers than traditional varieties, which result in more heads.

While stationed in Japan, a U.S. agronomist, S.C. Salmon, was attracted by the short-statured wheat. When he returned to the United States he brought with him Norin 10 as well as 15 other Japanese varieties. These were distributed to seven State agricultural experiment stations for testing. The research results disclosed that these varieties grew better on Japanese soils with rows 50 centimeters apart, contrasted with 15-25 centimeters in the United States. In addition, most of the flowers were male sterile; therefore, they crossed promiscuously with adjacent varieties instead of undergoing normal self-fertilization. The wheat flowers also unfolded earlier than U.S. varieties because of warmer soil and longer daylight in the United States.

Orville A. Vogel, a USDA Agronomist at Washington State University, recognized the breeding value of Norin 10. In 1949, a series of crosses, including Norin 10 x Brevor and Norin 10 x Baart, were developed. Vogel concentrated on derivatives of the Brevor crosses with Norin 10 and developed "Gaines," a disease resistance and high-yielding semidwarf winter wheat. Its response to fertilizers was very favorable. In 1961, Gaines was released by the Washington, Oregon, and Idaho Experiment Stations. Another varietal derivative of Norin 10, called "Nugaines," produced an even shorter straw-- about 30-35 centimeters shorter than standard varieties in the Pacific Northwest. It was released and distributed in 1965. Both Gaines varieties have yielded around 7 tons per hectare. Additional semidwarf wheat varieties, most having Norin 10 parentage, have been developed by 12 other states (77).

In 1954, long before Gaines was developed in the United States, E.N. Borlaug, [20] of the Rockefeller Foundation in Mexico, obtained some of the early crosses and breeding lines which carried Norin 10 characteristics (42). With these lines, he began a long research program concentrating on crosses between the most important Mexican varieties and Norin 10 x Brevor and Norin 10 x Baart. Around 70,000 varieties and lines were tested in different locations.

In the early 1960's, a series of high-yielding semidwarf spring wheat varieties were developed and released to Mexican growers. The most important varieties were: INIA 66, Noroeste 66, Tobrai 66, Siete Cerros, Super X, Jaral 66, Penjamo 62, Lerma Rojo 64, Ciano 67, Azteca 67, and Norteno. Most of them are high-yielding derivatives of Norin 10. Under normal weather conditions, their yields range between 4.5 and 6.0 tons per hectare. And some of them have excellent milling and baking qualities (INIA 66, Noroeste 66, and Ciano 67) and are highly resistant to rusts (Tabari 66).

These varieties have been introduced in many countries because they are relatively insensitive to length of day and thus allow a wide range of adaptation. They can be grown successfully in areas where other high-yielding varieties, taken out of their natural habitat, have failed. A greater amount of daylight provides a longer period of photosynthesis. Longer exposure usually means a shorter growing period and an earlier maturity, factors which might permit avoidance of dry seasons and insects and diseases, and afford an opportunity for practice of a double-cropping system.

The response of these high-yielding varieties to fertilization is very favorable. Tests have indicated that the increase in yields of the semidwarf varieties grown under conditions of high-level fertilization and adequate irrigation is 30 to 100 percent higher than for traditional varieties grown under similar conditions. Adequate

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[20] Borlaug, now head of CIMMYT, joined the Rockefeller Foundation in 1944.

application of fertilizers produces multiple tillering, larger heads, and higher yields. Because of the stiff, short straw, the plant does not lodge.

Distribution of Semidwarf Wheat

The introduction of the new semidwarf wheats to other countries began in 1963-64, when Borlaug visited India and suggested that the semidwarf varieties developed in Mexico could be tested there. As a result, India imported 250 tons of Sonora 64 and Lerma Rojo 64 seed from Mexico and distributed it to State Seed Farms and 5,000 selected wheat growers. Encouraged by successful tests, India imported 18,000 more tons in 1966. This seed was sown on close to 400,000 hectares. The new varieties accounted for about 20 percent of the total wheat area in 1967/68 and about 30 percent in 1968/69 in India (102).

In 1963, West Pakistan imported a small amount of seed of semidwarf varieties for testing, and in 1965, purchased 350 tons for further trials and multiplication. In view of the success with the first two shipments, plus the stress of two poor harvests, Pakistan launched in 1967 a record commercial seed purchase with Mexico of 42,000 tons for sowing on nearly 800,000 hectares.

In 1962, small experiment samples of the semidwarf varieties were introduced in Turkey. The Ministry of Agriculture purchased 60 tons of Sonora 64 seed in 1966. This spring variety was sown on close to 800 hectares, located in low elevations along the Mediterranean and Aegean Coasts. The use of high-yielding, frost-resistant winter varieties was programed with the support of CIMMYT and USAID. This wheat is to be grown in the severe climate of the highlands of the Anatolian Plateau. In 1967, Turkey imported 22,400 tons of seed of semidwarf varieties (Penjamo 62, Lerma Rojo 64, Super X, Siete Cerros, Mayo 64, Pitic 62, and Sonora 63). This was sown on about 600,000 hectares (101).

During the 1967/68 season in Afghanistan, semidwarf spring wheat accounted for about 26,000 hectares. It was sown, with good results, from 170 tons of seed purchased from Pakistan. The Government has launched a program for winter wheat in the colder and drier high elevations.

Tunisia and Morocco have also been using semidwarf wheat, but mostly on a test basis thus far. Their imports of the semidwarf varieties totaled 18,600 tons in 1966/67 and 64,600 tons in 1967/68.

The area sown to these varieties in South Asia, West Asia, and North Africa has expanded sharply:

	Hectares
1966/67. . . .	628,000
1967/68. . . .	4,122,000
1968/69. . . .	7,410,000
Source: (13).	

The area in 1968/69 accounted for roughly one-third of total sown area for these regions.

Table 1.--World supplies of wheat, coarse grains, and milled rice, as a percentage of total grain supplies, 1950/51-1967/68

Year	World production				World production plus beginning stocks			
	Wheat	Coarse grains	Milled rice	Total grains	Wheat	Coarse grains	Milled rice	Total grains
	Percent							
1950/51	26.6	54.9	18.4	100.0	-	-	-	-
1951/52	-	-	-	-	-	-	-	-
1952/53	-	-	-	-	-	-	-	-
1953/54	28.4	52.0	19.6	100.0	-	-	-	-
1954/55	27.1	53.6	19.3	100.0	-	-	-	-
1955/56	27.0	53.5	19.5	100.0	30.0	52.8	17.2	100.0
1956/57	27.6	52.6	19.8	100.0	30.3	52.4	17.3	100.0
1957/58	27.6	52.8	19.5	100.0	30.1	53.0	17.0	100.0
1958/59	28.9	51.5	19.6	100.0	30.4	52.4	17.1	100.0
1959/60	27.9	52.4	19.7	100.0	30.2	53.1	16.8	100.0
1960/61	27.2	53.1	19.7	100.0	29.4	53.9	16.7	100.0
1961/62	26.4	53.1	20.5	100.0	28.6	54.2	17.1	100.0
1962/63	28.1	52.6	19.3	100.0	29.6	53.7	16.7	100.0
1963/64	26.5	53.6	19.9	100.0	28.5	54.2	17.3	100.0
1964/65	29.1	50.8	20.1	100.0	30.0	52.4	17.5	100.0
1965/66	27.9	52.7	19.4	100.0	29.7	53.2	17.2	100.0
1966/67	30.2	52.0	17.8	100.0	30.9	52.8	16.3	100.0
1967/68	27.9	53.3	18.8	100.0	29.1	53.6	17.2	100.0
Average:								
1955/56-1959/60	27.8	52.6	19.6	100.0	30.2	52.7	17.1	100.0
1962/63-1966/67	28.3	52.3	19.3	100.0	29.7	53.3	17.0	100.0

Note: Dash indicates data not readily available in comparable form.

Source: Computed from table 2.

Table 2.--World grain supplies, 1950/51-1967/68

Year	World grain production				World grain production plus beginning stocks			
	Wheat	Coarse grains	Milled rice	Total grains	Wheat [1]	Coarse grains [2]	Milled rice [3]	Total grains
	Million metric tons							
1950/51.	163.8	337.8	113.4	615.0	185.2	–	113.4	–
1951/52.	168.1	–	117.4	–	191.3	–	117.4	–
1952/53.	199.7	–	126.1	–	217.4	–	126.1	–
1953/54.	198.9	363.4	136.7	699.0	233.9	–	136.7	–
1954/55.	187.8	370.5	133.5	691.8	238.4	–	133.5	–
1955/56.	200.4	396.6	144.5	741.5	252.9	444.5	144.5	841.9
1956/57.	211.6	403.4	151.4	766.4	265.1	457.9	151.4	874.4
1957/58.	210.4	402.5	148.9	761.8	263.6	464.6	148.9	877.1
1958/59.	236.2	421.5	160.6	818.3	285.5	491.8	160.6	937.9
1959/60.	223.2	418.8	157.5	799.5	283.3	498.4	157.5	939.2
1960/61.	222.2	435.0	161.0	818.2	282.9	519.4	161.0	963.3
1961/62.	211.5	425.5	164.2	801.2	274.3	519.3	164.2	957.8
1962/63.	237.8	445.1	163.5	846.4	289.9	524.1	163.5	977.5
1963/64.	226.2	458.1	170.2	854.5	279.7	532.0	170.2	981.9
1964/65.	257.2	449.8	177.8	884.8	304.2	531.2	177.8	1,013.2
1965/66.	247.0	465.8	171.3	884.1	295.7	530.4	171.3	997.4
1966/67.	284.9	490.4	167.9	943.2	319.2	545.8	167.9	1,032.9
1967/68.	275.9	527.1	185.8	988.8	312.7	578.4	185.8	1,076.9
Average:								
1955/56-1959/60	216.4	408.6	152.6	777.5	270.1	471.4	152.6	894.1
1962/63-1966/67	250.6	461.8	170.1	882.6	297.7	532.7	170.1	1,000.6

Note: Dash indicates data not readily available in comparable form.

1/ Stocks for United States, Canada, Argentina, and Australia (July 1 basis).
2/ Stocks for United States, Canada, Argentina, Australia, United Kingdom, EC, Other Western Europe, and Japan (July 1 or crop year basis).
3/ Stocks are relatively small and have been ignored.

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Table 3.--Regional changes in wheat production, area in wheat and wheat yields, 1955/56-1959/60 to 1962/63-1966/67

Regions	Production			Area			Yields		
	1955/56-1959/60	1962/63-1966/67	Percentage change	1955/56-1959/60	1962/63-1966/67	Percentage change	1955/56-1959/60	1962/63-1966/67	Percentage change
	-1,000 metric tons-			-1,000 hectares-			-Kg/hectares-		
United States.	29,793	33,473	12.4	19,877	19,295	-2.9	1,500	1,735	15.7
Canada 1/.	12,672	18,322	44.6	8,945	11,500	28.6	1,420	1,590	12.0
Argentina.	6,143	7,509	22.2	4,694	4,943	5.3	1,310	1,520	16.0
Australia & New Zealand.	4,684	9,672	106.5	4,040	7,301	80.7	1,160	1,325	14.2
Major exporters.	53,292	68,976	29.4	37,556	43,039	14.6	1,420	1,600	12.7
Japan.	1,374	1,180	-14.1	628	526	-16.2	2,190	2,240	2.3
EC	23,586	28,096	19.1	10,593	10,412	-1.7	2,230	2,700	21.1
United Kingdom	2,769	3,692	33.3	849	904	6.5	3,260	4,085	25.3
Other Western Europe . . .	9,203	10,203	10.9	7,319	7,149	-2.3	1,260	1,430	13.5
South Africa, Rep. of 1/	755	779	3.2	1,242	1,510	21.6	610	515	-15.6
Developed importers. . . .	37,687	43,950	16.6	20,631	20,501	-0.6	1,825	2,145	17.5
USSR	52,015	56,720	9.0	64,233	68,021	5.9	810	835	3.1
Eastern Europe	15,123	19,496	28.8	10,130	10,017	-1.1	1,490	1,945	30.5
Communist Asia	23,940	22,120	-7.6	26,495	24,720	-6.7	905	895	-1.1
Central plan countries . .	91,078	98,316	7.9	100,858	102,758	1.9	900	960	6.7
Central America & Caribbean.	1,236	1,787	44.6	2/ 930	2/ 802	-13.7	-	-	-
Mexico	1,215	1,760	44.8	896	766	-14.5	1,355	2,300	69.7
East South America	6/1,188	703	-40.8	1,732	837	-51.7	685	840	22.6
West South America	1,468	1,600	9.0	1,266	1,244	-1.7	1,160	1,285	10.8
North Africa	4,281	4,431	3.5	5,463	5,263	-3.7	785	840	7.0
West Africa.	18	26	44.4	-	-	-	-	-	-
East Africa.	359	488	39.0	-	-	-	-	-	-
West Asia.	10,727	12,420	15.8	11,363	11,949	5.2	940	1,040	10.6
South Asia	14,772	17,439	18.1	3/16,925	3/18,567	9.7	-	-	-
India.	9,096	11,154	22.6	12,300	13,396	8.9	740	830	12.2
Pakistan	3,557	4,127	16.0	4,625	5,171	11.8	770	800	3.9
Southeast Asia (Burma) . .	10	54	440.0	22	97	340.9	455	560	23.1
East Asia & Pacific 4/ . .	258	311	20.5	147	159	8.2	1,755	1,955	11.4
Less developed	34,317	39,270	14.4	37,848	38,918	2.8	-	-	-
Total world 5/	216,374	250,512	15.8	196,893	205,216	4.2	1,100	1,220	11.1

Note: Dash indicates data not readily available in comparable form.
1/ Seeded area basis. 2/ Mexico and Guatemala. 3/ India and Pakistan only. Afghanistan wheat area not included, but ranges between 2,200,000 hectares and 2,400,000 hectares. 4/ Korea and Taiwan only. 5/ Sum of regions shown. 6/ Figures may be too high because data are questionable for this period.

Table 4.--World wheat production by regions, 1955/56-1968/69

Region	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
								July/June year						
							1,000 metric tons							
United States.	25,504	27,363	26,011	39,666	30,420	36,870	33,540	29,719	31,212	34,928	35,806	35,699	41,433	42,899
Canada	14,130	15,596	10,688	10,834	12,113	14,108	7,713	15,392	19,689	16,349	17,661	22,517	16,137	17,686
Argentina.	5,250	7,100	5,810	6,720	5,837	4,200	5,725	5,700	8,940	11,260	6,079	6,247	7,000	5,740
Australia & New Zealand.	5,431	3,731	2,735	5,956	5,566	7,686	6,980	8,566	9,173	10,311	7,318	12,991	7,895	15,246
Major exporters.	50,315	53,790	45,244	63,176	53,936	62,864	53,958	59,377	69,014	72,848	66,864	77,454	72,465	81,571
Japan.	1,468	1,375	1,330	1,281	1,416	1,531	1,781	1,631	716	1,244	1,287	1,024	997	1,012
EC	24,350	18,791	24,590	24,334	25,864	24,184	23,161	29,624	24,570	29,278	30,488	26,522	31,350	32,397
United Kingdom.	2,641	2,891	2,726	2,755	2,830	3,040	2,614	3,974	3,046	3,793	4,171	3,475	3,902	3,469
Other Western Europe.	8,265	8,632	9,943	9,428	9,745	8,727	8,652	10,716	9,691	10,071	10,636	9,899	11,896	11,814
South Africa, Rep. of.	787	831	790	627	742	772	875	701	884	1,075	669	567	1,089	1,272
Developed importers	37,511	32,520	39,379	38,425	40,597	38,254	37,083	46,646	38,907	45,461	47,251	41,487	49,234	49,964
USSR.	42,100	53,900	49,750	62,606	51,718	46,274	52,262	54,400	40,000	57,700	46,500	85,000	64,000	67,231
Eastern Europe	14,423	12,440	16,379	14,300	18,071	16,491	16,715	17,407	17,527	18,042	21,981	22,521	25,360	25,309
Communist Asia	23,000	24,800	23,600	24,000	24,300	22,200	16,500	20,000	21,800	25,500	22,500	20,800	23,000	21,000
Central plan countries	79,523	91,140	89,729	100,906	94,089	84,965	85,477	91,807	79,327	101,242	90,981	128,321	112,360	113,540
Cent. Amer. & Caribbean.	870	1,265	1,398	1,360	1,289	1,213	1,424	1,527	1,723	1,930	2,119	1,634	2,091	1,827
East South America	1,643	1,565	1,387	775	568	779	587	737	370	918	803	687	517	1,181
West South America	1,475	1,425	1,225	1,633	1,584	1,532	1,564	1,525	1,627	1,656	1,660	1,535	1,532	1,578
North Africa	4,154	4,655	4,084	4,419	4,093	4,579	3,045	4,791	5,002	4,352	4,543	3,466	4,290	6,000
West Africa.	14	18	19	19	19	17	23	23	26	23	27	29	33	34
East Africa.	331	333	338	406	385	367	410	435	460	471	535	605	608	606
West Asia.	9,910	10,274	12,196	11,071	10,184	10,810	10,518	12,166	12,509	11,733	12,661	12,808	15,165	15,214
South Asia.	14,400	14,357	15,149	13,825	16,129	16,539	17,123	18,480	16,991	16,300	19,198	16,409	18,317	26,100
Southeast Asia	10	9	9	10	12	15	14	15	33	54	72	97	67	51
East Asia & Pacific.	220	245	254	263	310	304	324	310	247	329	323	344	334	362
Less developed	33,027	34,146	36,059	33,771	34,573	36,155	35,032	40,009	38,988	37,766	41,941	37,614	42,954	52,953
Total world.	200,376	211,596	210,411	236,278	223,195	222,238	211,550	237,839	226,236	257,317	247,037	284,876	277,013	298,028

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Table 5.--World wheat area by regions, 1955/56 to 1968/69

Region	July/June year													
	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
	1,000 hectares													
United States	19,138	20,141	17,707	21,468	20,929	20,995	20,870	17,680	18,416	20,139	20,057	20,185	23,785	22,364
Canada (seeded area) .	9,170	9,219	8,546	8,457	9,334	9,930	10,245	10,852	11,155	12,013	11,458	12,021	12,195	11,907
Argentina.	4,062	5,392	4,394	5,242	4,378	3,599	4,198	3,438	5,676	5,795	4,593	5,214	5,812	5,837
Australia & New Zealand.	4,156	3,215	3,608	4,242	4,980	5,505	6,034	6,740	6,758	7,335	7,162	8,508	9,175	10,972
Major exporters. . .	36,526	37,967	34,255	39,409	39,621	40,029	41,347	38,710	42,005	45,282	43,270	45,928	50,967	51,080
Japan.	663	658	617	599	601	602	649	642	584	508	476	421	367	322
EC	10,875	9,064	11,128	11,110	10,786	10,658	10,089	10,805	9,970	10,628	10,624	10,033	9,723	10,200
United Kingdom . . .	788	928	855	894	781	851	739	913	780	893	1,026	906	933	978
Other Western Europe .	7,188	7,351	7,325	7,316	7,416	7,255	6,847	7,419	7,139	7,218	7,134	6,690	6,883	6,673
South Africa, Rep. of (seeded area) . . .	1,161	1,344	1,370	1,117	1,216	1,287	1,442	1,409	1,515	1,599	1,637	1,394	1,612	2,141
Developed importers.	20,675	19,345	21,295	21,036	20,800	20,653	19,766	21,188	19,988	20,846	20,897	19,444	19,518	20,314
USSR	60,457	62,010	69,058	66,642	62,997	60,393	63,000	67,411	64,609	67,887	70,200	69,958	67,026	67,231
Eastern Europe . . .	10,125	9,844	10,227	10,238	10,216	9,627	9,675	10,001	9,865	10,255	9,867	10,096	10,237	10,670
Communist Asia . . .	26,739	27,272	27,541	26,623	24,300	27,800	24,600	24,400	24,200	25,500	25,000	24,500	24,500	24,500
Central plan countries	97,321	99,126	106,826	103,503	97,513	97,820	97,275	101,812	98,674	103,642	105,067	104,554	101,763	102,401
Cent. Amer. & Carib. 1/	834	972	990	873	980	847	770	768	847	852	869	672	898	756
East South America .	2,000	2,002	1,918	1,576	1,163	1,287	1,014	989	811	901	693	793	652	1,324
West South America .	1,273	1,232	1,227	1,254	1,345	1,335	1,301	1,316	1,245	1,240	1,241	1,186	1,081	1,068
North Africa	5,403	5,348	5,327	5,649	5,586	5,768	4,915	4,901	5,437	5,540	5,742	4,693	5,629	5,760
West Africa.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Africa.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Asia.	11,254	11,634	11,977	11,078	10,870	10,711	10,934	11,645	12,020	11,810	12,167	12,105	12,340	-
South Asia 2/	15,562	16,926	18,267	16,382	17,486	18,314	17,623	18,552	18,753	18,572	18,831	7,866	18,255	21,059
Southeast Asia (Burma) .	16	18	19	23	33	30	29	33	66	88	121	166	151	95
East Asia & Pacific 3/ .	134	139	164	150	148	149	146	153	154	156	163	168	168	165
Less developed . . .	36,476	38,271	39,889	36,985	37,611	38,441	36,732	38,357	39,333	39,159	39,827	27,649	39,174	-
Total world.	190,998	194,709	202,265	200,933	195,545	196,943	195,120	200,067	200,000	208,929	209,061	197,575	211,422	-

Note: Dash indicates data not available.

1/ Mexico and Guatemala.
2/ India and Pakistan only. Afghanistan wheat area not included, but ranges between 2,200,000 hectares and 2,400,000 hectares.
3/ Korea and Taiwan only.

Table 6.--Wheat yields by regions, 1955/56 to 1968/69

Region	July/June year													
	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
	Kilograms per hectare													
Major exporters:														
United States	1,330	1,368	1,470	1,850	1,450	1,760	1,610	1,680	1,700	1,730	1,640	1,700	1,740	1,920
Canada (seeded area) .	1,540	1,690	1,250	1,280	1,300	1,420	750	1,420	1,760	1,360	1,540	1,870	1,320	1,490
Argentina.	1,290	1,320	1,320	1,280	1,330	1,170	1,360	1,660	1,570	1,940	1,320	1,200	1,200	980
Australia & N. Zealand 1/	1,290	1,150	740	1,390	1,100	1,370	1,130	1,250	1,340	1,380	1,000	1,510	860	1,390
Developed importers:														
Japan.	2,210	2,090	2,150	2,140	2,360	2,540	2,740	2,540	1,230	2,450	2,700	2,430	2,720	3,140
EC	2,240	2,070	2,210	2,190	2,400	2,270	2,300	2,740	2,460	2,750	2,870	2,640	3,200	3,180
United Kingdom . . .	3,350	3,120	3,190	3,080	3,620	3,570	3,540	4,350	3,900	4,250	4,060	3,840	4,180	3,550
Other Western Europe .	1,150	1,170	1,360	1,290	1,310	1,200	1,260	1,440	1,360	1,400	1,460	1,490	1,730	1,770
S. Africa, Rep. of (seeded area) . . .	680	620	580	560	610	600	610	500	580	670	410	410	680	590
Central plan countries:														
USSR	700	870	720	940	820	770	830	810	620	850	660	1,210	960	1,140
Eastern Europe . . .	1,420	1,260	1,600	1,400	1,770	1,710	1,730	1,740	1,780	1,760	2,230	2,230	2,480	2,370
Communist Asia . . .	860	910	860	900	1,000	800	670	820	900	1,000	900	850	940	860
Less developed:														
Cent. Amer. & Carib. 2/	1,060	1,330	1,440	1,590	1,340	1,460	1,900	2,040	2,090	2,330	2,510	2,530	700	2,500
East South America . .	820	780	720	490	490	600	580	740	460	1,020	1,160	870	790	890
West South America . .	1,160	1,160	1,000	1,300	1,180	1,150	1,200	1,160	1,310	1,330	1,340	1,300	1,420	1,480
North Africa	770	870	770	780	730	790	620	980	920	790	790	740	770	1,040
West Africa.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East Africa.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Asia.	880	880	1,010	1,000	930	1,000	960	1,030	1,030	990	1,040	1,060	1,230	-
South Asia 3/. . . .	790	720	720	710	790	780	840	870	800	760	900	800	860	1,090
S.E. Asia (Burma). . .	620	500	470	430	360	500	480	450	500	610	590	580	470	540
E. Asia & Pacific 4/ .	1,640	1,760	1,550	1,750	2,090	2,040	2,220	2,030	1,600	2,110	1,980	2,050	2,040	2,190

Note: Dash indicates data not available.

1/ Australia only.
2/ Mexico only.
3/ India and Pakistan only.
4/ South Korea and Taiwan only.

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Table 7.--World wheat production by regions as a percentage of total production, 1955/56-1968/69

Region	July/June year													
	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
	Percent													
United States	12.7	12.9	12.4	16.8	13.6	16.6	15.9	12.5	13.8	13.6	14.5	12.5	14.9	14.4
Canada	7.1	7.4	5.1	4.6	5.4	6.3	3.6	6.5	8.7	6.4	7.1	7.9	5.8	5.9
Argentina	2.6	3.4	2.8	2.8	2.6	1.9	2.7	2.4	4.0	4.4	2.5	2.2	2.7	1.9
Australia & New Zealand	2.7	1.8	1.3	2.5	2.5	3.5	3.3	3.6	4.1	4.0	3.0	4.6	2.8	5.1
Major exporters	25.1	25.4	21.5	26.7	24.2	28.3	25.5	25.0	30.5	28.3	27.1	27.2	26.0	27.4
Japan	0.7	0.6	0.6	0.5	0.6	0.7	0.8	0.7	0.3	0.5	0.5	0.4	0.4	0.3
EC	12.2	8.9	11.7	10.3	11.6	10.9	10.9	12.5	10.9	11.4	12.3	9.3	11.2	10.9
United Kingdom	1.3	1.4	1.3	1.2	1.3	1.4	1.2	1.7	1.3	1.5	1.7	1.2	1.4	1.2
Other Western Europe	4.1	4.1	4.7	4.0	4.4	3.9	4.1	4.5	4.3	3.9	4.3	3.5	4.3	4.0
South Africa, Rep. of	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.2	0.4	0.4
Developed importers	18.7	15.4	18.7	16.3	18.2	17.2	17.5	19.6	17.2	17.7	19.1	14.6	17.6	16.8
USSR	21.0	25.5	23.6	26.5	23.2	20.8	24.7	22.9	17.7	22.4	18.8	29.8	23.2	22.6
Eastern Europe	7.2	5.9	7.8	6.1	8.1	7.4	7.9	7.3	7.7	7.0	8.9	7.9	9.2	8.5
Communist Asia	11.5	11.7	11.2	10.2	10.9	10.0	7.8	8.4	9.6	9.9	9.1	7.3	8.3	7.0
Central plan countries	39.7	43.1	42.6	42.7	42.2	38.2	40.4	38.6	35.1	39.3	36.8	45.0	40.7	38.1
Cent. Amer. & Caribbean	0.4	0.6	0.7	0.6	0.6	0.5	0.7	0.6	0.8	0.7	0.9	0.6	0.8	0.6
East South America	0.8	0.7	0.7	0.3	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.2	0.2	0.4
West South America	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.5	0.5	0.5
North Africa	2.1	2.2	1.9	1.9	1.8	2.1	1.4	2.0	2.2	1.7	1.8	1.2	1.6	2.0
West Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Africa	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
West Asia	4.9	4.9	5.8	4.7	4.6	4.9	5.0	5.1	5.5	4.6	5.2	4.5	5.5	5.1
South Asia	7.2	6.8	7.2	5.9	7.2	7.4	8.1	7.8	7.5	6.3	7.8	5.7	6.6	8.8
Southeast Asia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Asia & Pacific	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Less developed	16.5	16.1	17.1	14.3	15.5	16.3	16.6	16.8	17.2	14.7	17.0	13.2	15.5	17.7
Total world	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Data may not sum to totals due to rounding.

Source: Computed from table 4.

Table 8.--Producer prices for wheat, selected regions, 1950/51-1958/69

Year	United States Average price received by farmers [1]	United States Cash sale No. 2 & No. 1 Hard Winter, Kansas City [2]	Canada Final realized farm price, No. 1 Northern [3]	Canada Average farm price all grades [4]	Argentina Producer price on wagon, B.A. [5]	Argentina No. 2 semihard Domestic price [6]	Australia Average return to grower, bulk wheat, f.a.q. [7]	Japan Government fixed price [8]	EC Weighted average [9]
				U.S. dollars per metric ton					
1950/51.	73.50	83.80	64.50	53.40	58.80	52.60	51.90	-	-
1951/52.	77.50	89.30	66.50	56.00	65.40	65.40	58.60	-	-
1952/53.	76.80	85.30	71.50	60.20	91.10	91.90	61.60	-	-
1953/54.	75.00	83.40	58.80	50.10	100.00	94.10	49.70	-	-
1954/55.	77.90	87.10	62.70	47.10	100.00	96.60	49.30	-	-
1955/56.	72.80	80.10	59.20	50.40	55.80	50.30	49.40	-	-
1956/57.	72.40	81.20	60.90	47.90	40.40	41.50	51.50	97.40	95.10
1957/58.	70.90	79.00	60.40	47.80	47.00	48.00	53.50	101.40	88.10
1958/59.	64.30	71.30	61.00	50.30	26.50	32.10	54.30	101.80	94.00
1959/60.	64.70	73.50	61.30	50.90	36.20	38.90	55.40	101.80	89.70
1960/61.	63.90	71.30	66.40	57.90	45.90	47.30	56.10	104.40	89.80
1961/62.	67.20	75.30	67.30	60.60	38.40	45.50	59.40	110.60	95.10
1962/63.	75.00	82.70	63.70	56.60	45.40	50.80	57.40	116.80	94.40
1963/64.	68.00	73.50	67.00	59.10	57.60	62.60	56.50	119.80	95.70
1964/65.	66.10	57.30	64.30	54.40	47.30	48.20	55.50	125.30	95.40
1965/66.	65.80	61.70	68.40	57.40	40.70	53.20	58.10	130.80	94.80
1966/67.	81.60	68.70	67.40	59.70	37.30	48.90	58.60	139.60	96.20
1967/68.	68.70	58.10	61.60	53.70	-	-	61.90	145.50	93.70
1968/69.	65.00	51.80	-	-	-	-	-	151.70	-
Ave. annual rate of change [20]					- - Percent - -				
1950/51-1966/67.	-0.6	-1.9	0.3	0.7	-4.9	-3.1	0.5	-	-
1958/59-1966/67.	1.9	-1.8	1.1	1.4	3.1	4.5	0.6	4.1	0.6

See footnotes at end of table.

Table 8.--Producer prices for wheat, selected regions, 1950/51-1968/69--Con.

Year	United Kingdom, guaranteed price 10/	Other Western Europe, weighted average 9/	Republic of South Africa, guaranteed price 11/	Mexico, rural prices 12/	Brazil, agricultural value 13/	Chile, white wheat 14/	UAR, average value 15/	Kenya, support price 16/	Turkey, support price 17/	India, minimum price 18/	Pakistan, minimum price 19/
					- - U.S. dollars per metric ton - -						
1950/51.	-	-	-	-	-	57.50	61.00	-	-	-	-
1951/52.	-	-	-	-	-	54.80	61.00	-	-	-	-
1952/53.	-	-	-	-	-	55.00	61.00	-	-	-	-
1953/54	-	-	-	-	65.10	39.10	87.00	-	-	-	-
1954/55.	-	-	83.00	62.50	59.30	39.70	87.00	-	-	-	-
1955/56.	-	-	81.90	63.70	97.40	31.40	77.00	-	-	-	-
1956/57.	82.70	82.70	83.00	66.10	104.80	47.30	77.00	-	-	56.20	66.50
1957/58.	79.00	107.40	83.00	67.90	79.60	58.30	77.00	-	-	56.20	64.70
1958/59.	78.60	109.50	80.80	69.00	61.00	54.11	77.00	-	50.00	86.00	74.60
1959/60.	75.50	92.60	81.90	70.20	61.40	67.00	77.00	-	61.00	82.70	74.60
1960/61.	73.80	96.70	83.80	69.50	80.20	73.10	77.00	-	62.10	83.40	76.00
1961/62.	74.20	98.10	81.20	72.10	69.30	73.90	76.00	70.60	69.80	-	76.00
1962/63.	74.20	98.80	79.00	72.50	85.10	37.20	61.00	70.90	81.20	73.10	76.00
1963/64.	73.10	107.20	81.20	73.70	102.70	40.20	61.00	75.00	81.20	78.60	76.00
1964/65.	73.10	114.10	84.50	75.30	75.30	66.80	61.00	75.00	81.20	78.60	76.00
1965/66.	70.20	112.30	84.50	74.50	86.10	74.60	61.00	75.00	88.90	104.00	76.00
1966/67.	70.20	114.20	88.90	73.10	114.40	78.60	61.00	75.00	88.90	66.10	76.00
1967/68.	71.30	112.80	93.30	73.10	110.30	-	61.00	72.40	88.90	71.30	95.50
1968/69.	64.70	102.20	93.30	73.10	-	-	-	72.40	88.90	-	-
					- - Percent - -						
Ave. annual rate of change 20/											
1950/51-1966/67.	-	-	-	-	-	2.4	-	-	-	-	-
1958/59-1966/67.	-1.2	1.9	0.8	1.0	6.3	2.0	-	21/1.4	6.5	0.2	-1.2

See footnotes at end of table.

Footnotes: Table 8

Note: Dash indicates data is not readily available or is not in comparable form.

1/ Average price recived by farmers: From 1964 on, price is for farmers participating in the wheat program. Other farmers received lower prices.

2/ No. 2 Hard Winter, Kansas City cash sales (33) p. 22 and recent issues (41).

3/ Canadian Wheat Boards final realized price for No. 1 Northern wheat, basis in Store Fort William/Port Arthur or Vancouver (15) General Addenda Table XXI.

4/ Average farm price received for all grades and qualities of each crop (29), Field Crops 1908-63, Dominion Bureau of Statistics, Ottawa, March 1964.

5/ No. 1 Hard or Semihard, producer price on wagon, Buenos Aires (Official guaranteed price) (61), table 18.

6/ No. 1 Hard and Semihard, domestic price, Buenos Aires (61).

7/ Average return to grower (bulk wheat), f.a.q. (14), p. 171.

8/ Government fixed price for average quality wheat, including a small charge for bags and delivery to local government store (61).

9/ Basic producer prices as given by (61) weighted by production.

10/ Annual guaranteed price for millable winter wheat (61).

11/ Guaranteed price for Class B, Grade I wheat in bulk excluding agents' commission (61).

12/ Precio medio rural (28) p. 43; (27) pp. 147-148; and (8) June 1968, p. 17. Prices for recent years apparently are for the support prices of unirrigated wheat. Prices for irrigated wheat are lower.

13/ Average agricultural value (51).

14/ Wholesale price, white wheat from central region, bulk f.o.b., Santiago, converted at nontrade or free market exchange rates.

15/ Middling Hindi, government fixed producer price (45).

16/ Support price for average quality wheat (61).

17/ Support price for soft bread wheat.

18/ Government minimum purchase price for f.a.q. common white wheat. In 1961/62 there was no Government minimum price (61).

19/ Minimum price for standard quality wheat in West Pakistan (61).

20/ Simple average, computed from mean using least squares trend.

21/ 1961/62 to 1966/67.

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Table 9.--Supply price elasticities for wheat, selected countries and periods

Country	Price elasticity	Period analyzed	Prices used	Dependent variables	Source	Comments
United States.	Acreage allotments more important than price					
Canada	1.2 to 1.4		Total receipts received by farmers	Area seeded	(94)	Long-run model.
	0.56			"	(94)	Short-run model.
	0.87			"	(94)	Traditional model.
	0.5	1951-67	Final realized price	"	FRAD, ERS	Eq. 4 of chapter II.
	1.4	1951-67	No. 1 Manitoba	Production	FRAD, ERS	Eq. 2 of chapter II.
Argentina. . . .	0.7 to 1.3		Deflated price	Area harvested	(94)	
	0.4	1951-67	Deflated domestic price	"	FRAD, ERS	Eq. 10 of chapter II.
	0.9	1951-67		Production	FRAD, ERS	Eq. 8 of chapter II.
Australia.	3.5		Total receipts received by farmers	Area seeded	(94)	Long-run model.
	0.4			"	(94)	Short-run model.
	0.8			"	(94)	Traditional model.
	3.8	1947-64		Production	(25)	Long run.
	0.8	1947-64		"	(25)	5 years.
	0.2	1947-64		"	(25)	Short-run.
Japan.	0.2			Area harvested	(94)	Traditional model.
France	0.11			Area harvested	(94)	Long-run:) Past barley and wheat
	0.05			"	(94)	Short-run:) changes have had little
	0.1 to 0.2			"	(94)	Traditional:) effect on the area.
	0.6	1946-61	Deflated farm price	Area	(86)	With weather index & fertilizer variable.
	0.9 to 1.1	1946-61	Deflated farm price	Production	(86)	With weather index & time variable.
West Germany	0.2			Area harvested	(94)	
Italy.	0.4			Area harvested	(94)	Long-run.
	0.1			"	(94)	Short-run.
United Kingdom . . .	0.3 to 0.5			Area harvested	(94)	
Pakistan	0.08			Area	(2)	Source given is Krishna: A Reconsideration of the Economics of the International Wheat Agreement.

Table 10.--Selected regression results for key countries and regions, selected periods
$(Qs = a + b\ Pt_{-1} + cT)$

Region	Time period	a value	b value	c value	Price elasticity at the means	R^2	SE	Comments
United States	1955/56-1967/68	27.565	-0.009 (0.21)	0.857 (0.31)*	-0.02 / 0.43W	0.44	4.161	Average price received by farmers.
Canada	1955/56-1967/68	23.212	-0.211 (0.54)	0.729 (0.44)	-0.91 / 0.46W	0.35	3.504	Deflated final realized price No. 1 Northern.
Argentina	1955/56-1967/68	3.764	0.029 (0.03)	0.192 (0.14)	0.22 / 0.12W	0.18	1.821	Domestic price.
Australia	1957/58-1967/68	-24.396	0.541 (0.38)	0.306 (0.27)	3.91 / 0.21W	C.66	1.736	Average returns to growers.
Japan	1957/58-1967/68	5.676	-0.046 (0.02)*	0.145 (0.09)	-4.06 / -4.26W	0.50	0.240	Government fixed price.
EC	1957/58-1967/68	-20.731	0.484 (0.26)*	0.368 (0.22)	1.70 / 1.14W	0.64	1.907	Weighted average producer price.
United Kingdom	1957/58-1967/68	-7.343	0.120 (0.10)	0.268 (0.12)*	2.74 / 2.57W	0.66	0.375	Annual guaranteed price.
Other Western Europe	1957/58-1967/68	7.637	0.015 (0.03)	0.130 (0.10)	0.15 / 0.21W	0.36	0.803	Weighted average producer price.
South Africa, Rep. of.	1957/58-1967/68	0.959	-0.003 (0.02)	-0.013 (0.01)	-0.31 / -0.88W	0.06	0.172	Guaranteed price class B, Grade 1.
Central America & Caribbean.	1957/58-1967/68	0.319	0.005 (0.06)	0.075 (0.05)	0.24 / 0.70W	0.69	0.198	Mexico price.
East South America	1957/58-1967/68	0.429	0.007 (0.004)	-0.050 (0.02)*	0.83 / 0.65W*	0.41	0.228	Brazil price.
West South America	1957/58-1967/68	1.551	-0.0017 (0.003)	0.0174 (0.012)	-0.07 / -0.11W*	0.21	0.119	Chile price.
North Africa	1957/58-1967/68	-5.214	0.155 (0.11)	-0.128 (0.11)	2.41 / 0.73W	0.19	0.572	Canada export price.
Pakistan	1957/58-1967/68	1.904	0.025 (0.03)	0.044 (0.03)	0.46 / 0.37W	0.54	0.242	Minimum price for standard quality in West Pakistan.
India	1957/58-1967/68	7.414	0.041 (0.06)	0.255 (0.10)*	0.15 / 0.23W	0.46	1.008	Deflated rupee price.

Note: Qs = wheat production in millions of metric tons in year t. Pt_{-1} = producer price in U.S. dollars per metric ton as given in table 8, lagged 1 year. T = time, 1955/56 or 1957/58 = 1. The standard error of the regression coefficient is enclosed in parentheses, an asterisk indicates a t value of 1.7 or larger. The price elasticity followed by a W was computed from similar equations having a dummy variable for weather.

Table 11.--India's wheat area, yield and production, total and semidwarf varieties, 1965/66-1970/71

Year	All wheat			Semidwarf varieties				
	Area	Yield	Production	Area	Yield	Production	Percentage of total Area	Percentage of total Production
	1,000 ha.	kgs/ha.	1,000 m. tons	1,000 ha.	kgs/ha.	1,000 m. tons		
1965/66. .	13,427	913	12,257	-	-	-	-	-
1966/67. .	12,656	834	10,424	-	-	-	-	-
1967/68. .	12,838	887	11,393	517	2,472	1,278	4.0	11.2
1968/69. .	14,998	1,103	16,540	2,942	2,666	7,843	19.6	47.4
1969/70. .	15,958	1,169	18,652	4,415	2,535	11,191	27.7	60.0
1970/71. .	16,000	1,250	20,000	4,050	n.a.	n.a.	25.3	n.a.

Note: Dash indicates zero or negligible; n.a. indicate data are not available.

Table 12.--Pakistan's wheat area, yield, and production, total and semidwarf varieties, 1966/67-1970/71

Year	All wheat			Semidwarf varieties				
	Area	Yield	Production	Area	Yield	Production	Percentage of total Area	Percentage of total Production
	1,000 ha.	kgs/ha.	1,000 m. tons	1,000 ha.	kgs/ha.	1,000 m. tons		
1966/67. .	5,210	759	3,952	5	2,800	14	-	-
1967/68. .	5,417	811	4,394	101	2,218	224	1.9	5.1
1968/69. .	6,060	1,069	6,477	957	2,230	2,134	15.8	32.9
1969/70. .	6,277	1,069	6,711	2,630	1,777	4,674	42.0	69.6
1970/71. .	6,219	1,178	7,328	3,252	1,538	5,000	52.3	68.2

Note: Dash indicates zero or negligible.

WHEAT PRODUCER PRICES IN ARGENTINA AND CANADA
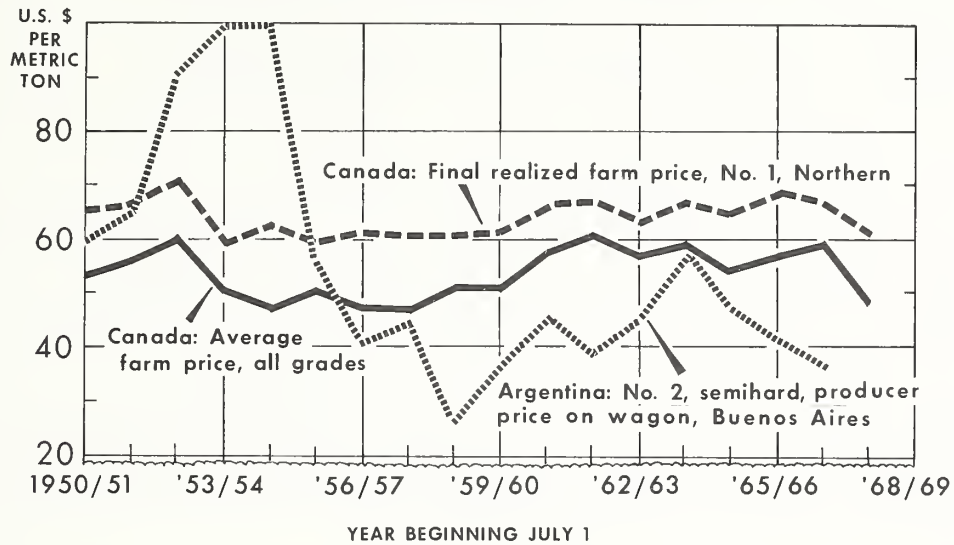
U.S. $ PER METRIC TON

Canada: Final realized farm price, No. 1, Northern

Canada: Average farm price, all grades

Argentina: No. 2, semihard, producer price on wagon, Buenos Aires

80

60

40

20

1950/51   '53/54   '56/57   '59/60   '62/63   '65/66   '68/69

YEAR BEGINNING JULY 1

Figure 3

ARGENTINE WHEAT PRICES
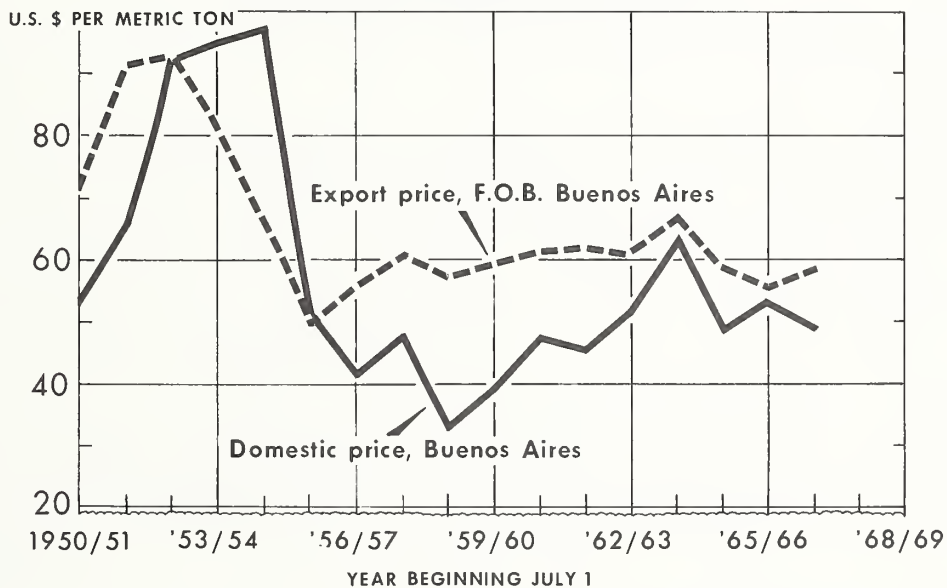
U.S. $ PER METRIC TON

Export price, F.O.B. Buenos Aires

80

60

40

Domestic price, Buenos Aires

20

1950/51   '53/54   '56/57   '59/60   '62/63   '65/66   '68/69

YEAR BEGINNING JULY 1

Figure 4

37

WHEAT PRODUCER PRICES IN THE UNITED STATES AND AUSTRALIA

U.S. $ PER METRIC TON

U.S.: Cash sales, No. 2 hard winter, Kansas City

U.S.: Average price received by farmers

Australia: Average return to growers, bulk wheat F.A.Q.

YEAR BEGINNING JULY 1
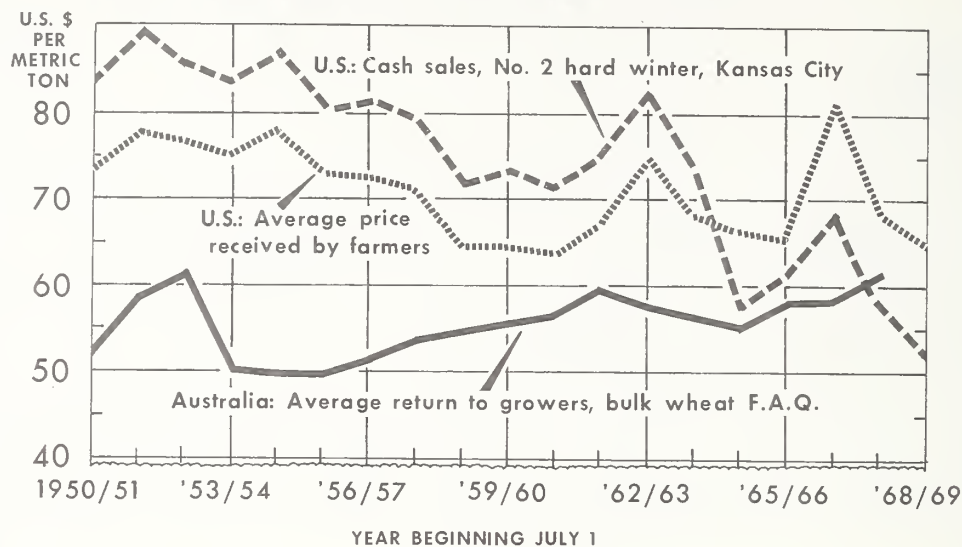
U.S. DEPARTMENT OF AGRICULTURE   NEG. ERS 7666-70 (5)   ECONOMIC RESEARCH SERVICE

Figure 5

WORLD GRAIN SUPPLIES
Production Plus Stocks

MIL. METRIC TONS

Coarse grains*

Wheat

Milled rice
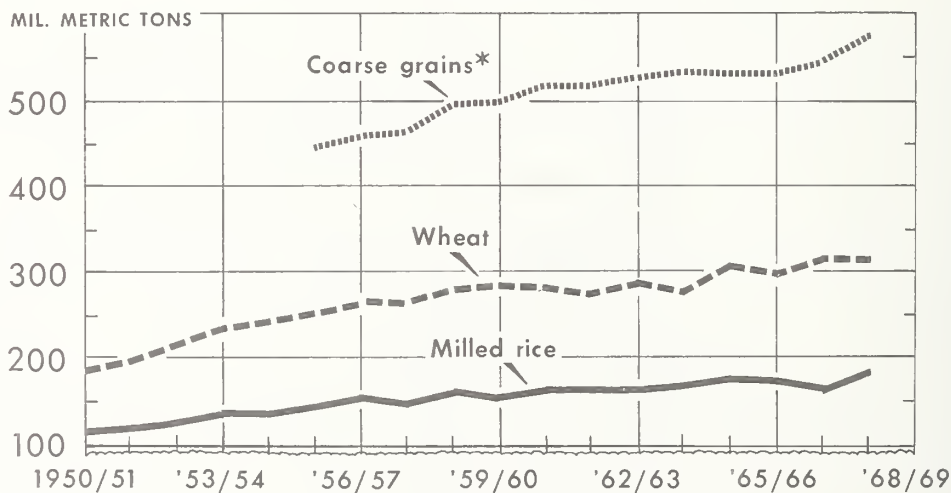
*STOCK DATA FOR COARSE GRAINS NOT READILY AVAILABLE FOR YEARS PRIOR TO 1955 '56.

U.S. DEPARTMENT OF AGRICULTURE   NEG. ERS 7667-70 (5)   ECONOMIC RESEARCH SERVICE

Figure 6

III.--DEMAND: WHERE, HOW MUCH, AND WHY

> The desire of food is limited in every man
> by the narrow capacity of the human stomach.
> --Adam Smith in The Wealth of Nations

Wheat provides directly about 20 percent of the total food calories consumed by the world's population. It is the national food staple in about 45 countries, which account for 35 percent of world population. Dependence on wheat varies widely geographically. In Southern and Eastern Europe, the Soviet Union, Argentina, and West Asia, over 30 percent of the calories come from wheat; in East and West Africa and East Asia, less than 5 percent are derived from wheat (42).

Wheat is the major ingredient in most breads, rolls, chapatties 21/, crackers, cookies, biscuits, cakes, doughnuts, muffins, pancakes, waffles, noodles, pie crust, ice cream cones, macaroni, spaghetti, pudding, pizza, bulgur, rolled flakes, many hot and ready-to-eat breakfast foods, and baby foods. Germ, bran, and malt are additional wheat products.

Wheat is also used as a feed, both in the form of grain or byproducts from flour milling, and as a forage crop. 22/

Wheat grain varies widely in chemical composition. Though often thought of only as a starch crop, wheat also contains proteins, minerals, and vitamins. The differences in chemical composition have far-reaching effects on processing, utilization, nutritive value, and cost.

Wheat varieties differ considerably in milling characteristics--notably in bran separation, friability, and rapidity of bolting. 23/ Climate, soil, and other environmental factors, as well as genetic factors, cause wide fluctuations in the composition of wheat varieties.

The definition of wheat quality usually varies from one class to another and is dependent on the wheat's suitability for a given product (fig. 7). For example, the quality of a soft winter or white wheat is defined in terms of the wheat's suitability for soft wheat milling and for the production of cakes, cookies, and crackers. The quality of a durum wheat is defined in terms of the wheat's suitability for semolina and macaroni production. Hard red winter and spring wheat quality is defined in terms of specific milling and baking properties that determine the suitability of these wheats for milling and bread production.

Therefore, in viewing demand, it should be recognized that wheat is not a homogeneous commodity; rather, there are subsets of demand schedules for the different classes of wheat. Generally speaking, demand for the various qualities of wheat differs within and between countries. Also, with time, demand may shift from one quality or class to another; the shifters may be income, technology, price, tastes, and preferences.

21/ Chapatti, a pancake-shaped, unleavened bread, is a basic food in India and Pakistan.

22/ Use of wheat for feed has increased sharply in several developed countries since 1968. Much of this increase stems from large wheat supplies and lower prices, both of which have made wheat competitive with other grains for feed.

23/ Bolting refers to the sifting property of wheat flour.

Despite the existence of subsets of demand schedules, however, demand analysis of wheat by class on a world basis is not feasible--the necessary data are either lacking or unreliable. The approach thus used in this report is analysis of an aggregated demand for wheat, though it was recognized that quality differences do exist among the regions.

Utilization

Adam Smith may have only been partly correct in his statement about the limitation on man's desire for food. In many of the LDC's the narrow capacity of the human stomach has not been filled. In the developed regions where it has, desire has led to vast changes in the diet. These concepts have particular application to wheat.

Patterns

An overall indicator of the pattern of world wheat consumption is annual per capita availability. In discussing the world pattern, a 3-year average for the base period centered on 1965/66 is used. Availability includes the July-June year's trade and stocks coupled with the production of the first year shown. (For a more detailed explanation see ch. I.)

During the base period, regional per capita availabilities ranged widely--from 3.1 kilograms in Southeast Asia to 283.9 kilograms in the Soviet Union (table 13). The width of the scale reflects the broad spectrum of cereal consumption. Wheat is a basic staple in the Soviet Union, but it is not in Southeast Asia--rice is.

Per capita availability in 1964/65-1966/67 in the four major supplying countries ranged from 95.8 kilograms in the United States to 212.2 kilograms in Canada. Availabilities in Australia and Argentina were 194.3 and 172.8 kilograms, respectively. Though the level for the United States is much lower, the portion used for feed is also low, so that the range of direct per capita consumption for food is not nearly as great. 24/

Among the developed importers, per capita availabilities in the EC, the United Kingdom, and Other Western Europe ranged between 154.2 and 131.1 kilograms. In South Africa and Japan, consumption was 68.6 and 48.6 kilograms, respectively.

In the central plan area, Eastern Europe's availability of 218.5 kilograms was second to the Soviet Union's. In both regions, large quantities of wheat are used as feed. Communist Asia, on the other hand, had a relatively low availability of 36.0 kilograms (table 13). Commonly thought of as a rice producer and consumer, Communist Asia is one of the world's largest wheat producers. But this is offset by the region's immense population.

The levels of per capita availability in the less developed area ranged widely-- from 3.1 kilograms in Southeast Asia to 164.1 in West Asia. Where no wheat is produced, the level of consumption is low and is dependent on imports; this applies to Southeast and East Asia 25/ and East and West Africa, where availability ranged from 3.1 to 12.1 kilograms. West Asia and North Africa are wheat-producing regions, and

24/ Feed use accounted for about 33 percent of Canada's total domestic wheat use; 25 percent of Australia's; 5 percent of Argentina's; and 10 percent of the United States.
25/ Small amounts of wheat are produced in Burma, Taiwan, and South Korea.

this is reflected in their relatively high level of per capita consumption of 164.1 and 103.1 kilograms, respectively. 26/ Excluding Argentina, in the three regions of Latin America where wheat is both produced and imported, per capita availability ranged between 35.8 and 59.5 kilograms.

In viewing the world pattern of wheat availability or consumption during the base period, one can conclude the following regarding per capita availability: (1) It is high in the major wheat-producing regions; (2) it is low in nonproducing regions; (3) it is relatively high in developed regions; and (4) it is relatively low in the LDC's. One can expect then, that per capita availability should be higher for a developed non-producer than for a less developed nonproducer. Thus, there is a relationship between per capita availability and per capita income and production (fig. 8).

Trends

> All life moving to one measure--Daily bread. --W.W. Gibson

The demand for wheat as a food accounted for about four-fifths of world utilization of wheat before World War II (9). This proportion may not have changed greatly until very recently, when increased world production led to stock buildups, lower prices, and subsequently increased feed utilization.

In viewing per capita availabilities, there appears to be a downtrend in most wheat-producing developed regions and an uptrend in most LDC's (table 14). It is generally concluded that, as per capita income rises from a relatively low level, consumption of wheat will increase, but as income continues to increase, per capita consumption will decline to some level and thereafter will remain relatively stable.

A comparison of 1954-56 and 1964-66 also reflects the influence of income on consumption (table 14). Per capita availabilities in all four major exporting regions-- the United States, Canada, Argentina, and Australia and New Zealand--declined during the 10-year interval. Per capita availability in the United Kingdom, Other Western Europe, and the Republic of South Africa declined 5, 2, and 4 percent, respectively. Such declines generally reflect a consumption shift from wheat products. The EC, on the other hand, showed an increase in availability of 3 percent during the interval. This rise is mainly due to an increasing use of wheat for feed resulting partly from EC grain policy (83). Japan's per capita availability increased 21 percent, reflecting the effect of rising incomes and shifting consumption patterns. 27/

In the central plan regions, per capita availabilities increased sharply in the Soviet Union and Eastern Europe, which was surprising since their levels in 1954-56 at 140 and 205 kilograms, respectively--were relatively high already and their consumption of wheat for food appears to be declining (31). However, since stocks are included in availabilities for these regions, part of the increase may be attributed to an increase in stocks. Also, there are indications that feed use of wheat may be increasing along with increases in livestock production. Communist Asia's per capita availability, on the other hand, declined slightly, from 37.4 to 36.0 kilograms.

Per capita availabilities in the LDC's generally increased; East South America was the only region in the less developed area that had a decline (tables 21, 22).

26/ Turkey, Iran, Morocco, Algeria, and the UAR are the large wheat producing countries in these 2 regions.

27/ Feed use of wheat has also been rising in Japan; it amounted to about 10 percent of total consumption in the base period (83).

Increases in all other regions, except West Asia, ranged from about 30 to 50 percent. Per capita availability in West Asia, which was already relatively high, increased 10 percent to 164 kilograms. 28/ Though the increase in four of these regions--West Africa, East Africa, Southeast Asia, and East Asia--was relatively high in the 10-year interval between 1954-56 and 1964-66, availabilities were still relatively low. Also, these are not wheat-producing regions, and much of the wheat was imported under food aid programs.

Factors Affecting Demand

The demand for wheat may be thought of as the various quantities which consumers will purchase at various prices, other things being equal. The quantity taken will be affected by a number of factors, such as (1) consumers' income, (2) price, (3) consumer tastes and preferences, (4) the number of consumers, and (5) prices of substitutes.

There are two major markets or uses to which the domestic demand can be related-- the market that consumes wheat as a food directly 29/ and the one that consumes products of livestock which have been fed wheat. There are other significant uses of wheat--in industrial products (starch and alcohol) and as seed to be sown for the next crop, for example--which account for something less than 10 percent of total utilization (46).

Unfortunately, data do not permit an intensive analysis of the demand functions for each market on a global basis; as was pointed out earlier, demand has been aggregated to a national or regional total utilization. 30/

There has been a great deal of research conducted on the demand for wheat. Waugh cites a 5-page paper published by Lehfeldt in 1914 as one of the first two serious attempts to measure demand statistically. According to Waugh, Lehfeldt "attempted to measure the elasticity of the true demand curve for wheat, considering the whole world as a single market (110)."

A review of demand studies was made to identify the derived relationships that seemed reasonable and could be used for the projection models. The following sections summarize the findings. Ultimately, however, the pooled judgment of experts was used in arriving at many of the demand relationships used for the projections of this study. Here, the situation was analogous to one described by Brandow: "Rigorous statistical estimation falls far short of producing the required information. In a sense, a set of criteria including theoretical relations, good but not 'best' fits to recent data, conformance with commonly observed market behavior, and technological relationships replaced error variances or variance rations in simple models assumed to specify relevant relationships correctly (12)."

Income

Know when to spend and when to spare... --Fuller

The relationship between income and consumption (availability) was discussed briefly in the preceding sections. Traditionally, this relationship has been used

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28/ Wheat, which was probably first grown in West Asia, is a basic food staple of this region.

29/ Directly is a relative term in this sense for in almost all cases, wheat undergoes some degree of processing before it is consumed as food.

30/ For a discussion on demand functions for different wheat markets in the United States see (110).

under ceteris paribus conditions to explain or estimate changes in consumption, given a certain schedule of demand. Throughout the world, there is a fairly well defined pattern of income-consumption relationships as shown in table 22, which lists the co-efficients derived in various studies.

For most high-income wheat-producing nations, the income elasticities of demand are negative. That is, as incomes rise, with other factors held constant, consumption of wheat declines. Thus, for the United States, Canada, most of the European countries, and Australia, per capita consumption has been declining and might be expected to continue. The elasticity coefficients for these countries range from -0.1 to -0.5. For the most part, the income elasticities are related to direct consumption of wheat as a food or food product. Indirect consumption of wheat through the use of wheat as a feed will be discussed later.

For most low-income nations, where per capita wheat consumption is relatively low, the income elasticities of demand are positive. That is, as incomes rise, with other factors held constant, consumption of wheat increases. A large part of the less developed area would fall in this category, and we can conclude that consumption there will increase as incomes rise. This is very definitely reflected in the relatively high income coefficients listed in table 22. In general, the income elasticities range from 0.1 to 0.8, indicating that future income growth in the LDC's could provide a substantial kick to wheat consumption.

One developed region which traditionally produced and consumed very little wheat is Japan. During 1933-37, rice accounted for 86 percent of cereal consumption (56). Since World War II, however, the pattern of cereal consumption has changed markedly, with wheat consumption increasing and accounting for a larger share of the total. Where formerly wheat, in noodle form, was a low-grade substitute for rice, it is now largely consumed in the form of bread. While the increase in consumption of wheat is associated with the rapid increase in Japan's economic development, income cannot account for all of the change. Consumers' tastes and preferences shifted decidely as an outgrowth of wartime rationing, a school lunch program, and a vigorous promotional campaign for wheat products. However, income is still a strong positive influencing demand factor with an estimated elasticity of about 0.3.

Argentina is one LDC where income has a negative influence on consumption. But considering that Argentina is a major wheat producer and has a relatively high level of consumption, this is not particularly surprising. The income elasticity of demand has been estimated at -0.6.

Consideration should also be given to the effect income has on feed uses of wheat. The intermediary food through which wheat flows is, of course, livestock products. And quantitative analysis supports the general theory that throughout the world, consumption of most livestock products is highly responsive to income growth. Therefore, for most nations, regardless of their stage of economic development, as incomes increase or continue to increase, consumption (and production) of livestock products will also increase at a corresponding rate. It follows then that if livestock production rises, demand for feed will also increase. So, given the right set of conditions, consumption of wheat for feed might increase when consumption of wheat for food is declining. At present, the right set of conditions are in force and this phenomenon can be observed in the United States, Canada, and many European countries, including the Soviet Union. Utilization data is particularly weak in this respect, so analyses have fallen short of yielding significant results.

However, there is statistical evidence to support the conditions that trigger the use of wheat for feed. The immediate indicator is price, for feed use will step up as soon as the price of wheat reaches a level where it is competitive with other feeds. Traditionally, wheat has been priced higher in comparison with coarse grain, and it

simply was not profitable to feed wheat when other low-cost feeds were available. Generally, these low wheat price levels have resulted from large world supplies of wheat with accumulations of stocks. This has been very apparent in the past 2 years.

Prices

Consumer response to changes in price is one of the important concepts in demand analysis. Elasticity of demand is most often used to indicate how responsive the quantity taken of a commodity is to changes in the commodity's price, given a schedule of demand. It is defined as the percentage change in quantity consumed associated with a percentage change in price (when the price change is small). The elasticity coefficients are normally negative, since price and consumption would be expected to change in opposite directions (68).

The paucity of price data for wheat is a serious limitation to a statistical analysis of price/demand relationships on a global basis. However, there have been a number of country studies from which generalizations can be made. The price elasticities derived in some of these studies are listed in table 16. The results of these studies tend to support the following hypotheses:

1. For the wheat-producing regions (both developed and less developed, food demand for wheat is quite inelastic. 31/ That is, the response to changes in price is relatively small.

2. For the LDC's that do not produce wheat, demand for wheat is more elastic (or less inelastic). That is, the response to changes in price is relatively great.

3. For the developed non-wheat-producing regions (for example, Japan), demand for wheat is more elastic (or less inelastic).

Having targeted the nature of the price elasticities of demand, efforts were then directed to determine the extent that wheat demand at the country and world level is reflected in internal and trade prices. To measure this influence, several regressions were formulated expressing price as a function of world supplies. Though this might seem contradictory to conventional demand concepts which use price as an independent variable, there nevertheless is an implicit "demand" function. Waugh has stated:

> There would always be at least two kinds of demand elasticity: the elasticity of expected consumption with respect to price and the elasticity of expected price with respect to the quantity sold. ...Back in the 1920's and 1930's they were sometimes called supply-price curves, and expected price-marketing curves (110).

Since a single world price for wheat is not readily available, an export price of one of the major suppliers was used an indicator of world price levels. Simple regressions between the export prices of Canada, Australia, Argentina, and the United States (adjusted for subsidies) show that these prices are highly correlated. Similar analyses between these export prices and selected import prices (after allowing for transportation costs) also show a high degree of correlation.

31/ Waugh expounds on this concept in reference to part of the U.S. farm problem. "This statistical fact lies at the heart of the farm problem. A small surplus... depresses prices severely (110)."

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Because domestic supplies might have a special influence on a country's export price, they were considered separately from the supplies of the rest of the world. Thus, the regressions had export prices as a function of domestic and world supplies. In addition, the farm price was also related to the same factors to determine the extent that world supply conditions directly influence domestic farm prices. Below are the regressions for Canada.

The two independent variables--Canadian wheat supplies and other world wheat supplies--are more highly correlated with export prices than with producer prices (eqs. 1 and 2). As would be expected, the coefficients are negative in both cases, indicating that a drop in price is associated with an increase in per capita wheat supplies. The results of equation 1, if one accepts them, indicate that with a 10-percent increase in Canadian supplies, producers' price will fall 3 percent. A 10-percent increase in the rest of the world's supply will decrease producers' price by 1 percent.

Equation 2 indicates that Canadian export prices are more responsive to world wheat supplies than to Canadian supplies. A 10-percent increase in Canadian supplies decreases the export price by less than a percent, while a similar increase in world supplies decreases the export price by 8 percent.

Equations 3 and 4 include additional independent variables--barley prices and trend. In both cases, changes in world supplies affect Canadian prices; the largest impact is still on export prices, as would be expected.

$$(1) \quad PFW = 92.9 \quad - 12.32 \ SW/P - 0.09 \ WSWW/P$$
$$R^2 = .22 \quad t = 1.7 \qquad 0.4$$
$$SE = 5.80 \quad E = -0.31 \qquad - 0.11$$
$$DW = 0.77$$

$$(2) \quad PMW = 125.57 \quad - 1.67 \ SW/P - 0.65 \ WSWW/P$$
$$R^2 = .61 \quad t = 0.3 \qquad 4.3$$
$$SE = 4.32 \quad E = 0.04 \qquad - 0.79$$
$$DW = 1.64$$

$$(3) \quad PFW = 42.1 \qquad 0.00 \ SW/P - 0.22 \ WSWW/P + 0.66 \ PFB + 0.78 \ T$$
$$R^2 = .89 \quad t = 0.0 \qquad 1.1 \qquad\quad 2.58 \qquad 3.3$$
$$SE = 2.35 \quad E = 0.00 \qquad - 0.29 \qquad\quad 0.54 \qquad .11$$
$$DW = 2.40$$

$$(4) \quad PMW = 129.63 \quad - 0.75 \ SW/P - 0.73 \ WSWW/P + 0.19 \ T$$
$$R^2 = .62 \quad t = 0.1 \qquad 3.6 \qquad\quad 0.7$$
$$SE = 4.41 \quad E = -0.02 \qquad - 0.90$$
$$DW = 1.82$$

Where the period analyzed was 1951/52-1966/67 and

PFW   = Farm price of wheat in current Canadian dollars per ton (final realized price received by farmers, Northern No. 1, in Store Ft. Wm./Port Arthur).

PMW   = Export price of wheat in U.S. dollars per ton (No. 1 Manitoba, basis in Store Ft. Wm./Pt. Arthur).

PFB   = Farm price of barley in current Canadian dollars per ton (final realized price of No. 3, Canadian Western 6-row barley, basis in Store Ft. Wm./Pt. Arthur).

SW/P   = Per capita Canadian wheat supply, production plus August 1 stocks, in 1,000 kilograms.

45

WSWW/P   = Per capita world wheat production plus July 1 wheat stocks of the United
           States, Canada, Argentina, and Australia, minus per capita supply of wheat
           available in Canada (basis July 1 stock), in kilograms.

T   = Time with 1950/51 = 1.

DW   = Durban Watson statistic.

SE   = Standard error of the estimate.

E   = Elasticity calculated at the means.

t   = Student t test value.

   For Argentina, regression analysis yielded a low correlation (R^2=.25) in explain-
ing changes in producer prices (deflated) and export prices by Argentina and world
wheat supplies. Exchange rates, Government restrictions, the variable level of export
taxes, and the deflation index may account for the poor relationship. In two of the
equations (2 and 4), the coefficients for world wheat supplies (WSWW/P) are positive
where a negative sign was expected. Again, as in the case of Canada, world supplies
have a larger impact on domestic prices. If the results of the equations are accepted,
a 10-percent increase in domestic wheat supplies will decrease domestic prices by 1 to
2 percent. However, while world supplies will affect export prices, they do not neces-
sarily affect domestic prices.

(1) PMW   = 147.20   - 0.007 SWD/P - 0.79 WSWW/P - 0.94 T
    R^2 =   .60 t =   .03   2.3   - 1.68
    SE   =   9.1   E =-0.04   - 1.11

(2) PFW/C   = -2.14   - 0.003 SW/P + 0.05 WSWW/P + 0.009 YP + 0.04 T
    R^2 =   .51 t = 1.2   1.3   0.6   0.5
    SE   =   .87 E =-0.18   0.75   0.76   0.06

(3) PFW/C   = 2.65   - 0.001 SW/P - 0.0001 WSWW/P + 0.50 PFC/C + 0.08 T
    R^2 =   .81 t = 1.3   0.01   4.5   2.5
    SE   =   .54 E =-0.12   -0.003   0.50   0.14

(4) PFW/C   = 1.28   - 0.003 SW/P + 0.05 WSWW/P + .07 T
    R^2 =   .49 t = 1.5   1.6   1.4
    SE   =   .85 E =-0.21   0.85

Where the period analyzed was 1951/52-1966/67, and

PMW   = Export price of Argentine wheat in U.S. dollars per ton (No. 1 Semihard and
            Hard, f.o.b. Buenos Aires).

SWD/P   = Argentine per capita wheat supply (production plus beginning stocks)
            December 1 crop year basis, in kilograms.

WSWW/P   = Per capita world wheat production plus July 1 stocks of four major exporters
            minus SWD/P, in kilograms.

T   = Time, 1950/51 = 1.

PFW/C   = Domestic price of wheat, No. 1 and No. 2 Semihard, Buenos Aires, in pesos
            per ton deflated by the cost of living index (1962=100).

PFC/C   = Market price for yellow corn at Buenos Aires in pesos per ton deflated by the cost of living index (1962=100).

Y/P   = Per capita income in 1962 pesos.

One could infer from these relationships that the demand for wheat was elastic since the price flexibilities indicate that the relative change in price levels is less than the relative change in supply levels. However, these relationships indicate that the inelasticity of demand confirmed by other analyses is being muted by the price, supply, and export policies of the major exporters. On the other hand, these analyses show that the major exporters cannot completely isolate the effect that a substantial production change would have on the world price level.

Tastes and Preferences

> Do not do unto others as you would that they should do unto
> you. Their tastes may not be the same. --George Bernard Shaw

The concept of changing tastes and preference is often confused with changing consumption due to changes in income. But these are two separate demand determinants whose effects are difficult to separate analytically. Taste and preference changes may be evolutionary, resulting from economic development or some external influence. Perhaps one of the best illustrations from the standpoint of wheat is the pattern and trend of consumption in Japan. It has been noted that prior to World War II rice accounted for 86 percent of cereal consumption; wheat was considered an inferior substitute and was consumed in small quantities in the form of noodles.

After World War II, there was a decided shift in tastes, with per capita consumption of rice declining and wheat increasing. Was the shift inevitable with Japan's rapid economic development? Keefer and Barry commented that "no necessary replacement of rice by wheat appears obvious except at the margin as an incidence of greater diversification (65)." They list the following as the taste shifters:

      1. The school lunch program initiated in 1947.

      2. Promotion of the nutritional benefits of wheat products.

      3. Emulation of "Western" tastes.

      4. Urbanization.

Thus, without these shifters there may have been little change in per capita wheat consumption in Japan though income increased at an astonishing rate. The premise of shifting tastes and preferences is one important cornerstone for promotion of any product in a new market. Market promotion programs for wheat have, in fact, been developed in several of the traditional rice consuming countries of the Far East, in addition to Japan.

Consumption patterns for wheat may have been given an impetus from food aid programs. Wheat has been the only food grain in large enough supply to fill the food needs of recipient countries even though these countries may have preferred rice or another food grain.

Of course, taste may shift away from wheat to other products, as it has in many of the developed countries. Except in Japan, however, the shift has not been to another grain, as it has in the LDC's, but to other commodities groups--such as livestock products and fruits and vegetables.

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Changing tastes and preferences are reflected in the trend variable of the pro-
jection models used in this report. The trend here is the change in wheat consumption
net of price changes. This concept is discussed in more detail in chapter VI.

Substitution From Price Effects

> ...And I heard a voice say, A measure of wheat for a penny;
> and three measures of barley for a penny... --Revelation 6:5,6

The previous section focused on substitution or shifting demand as a result of
changing tastes. But there is also substitution from changing prices. A change in
the relative price structure of competing products normally results in a shift in con-
sumption. 32/ The consumer substitutes a relatively lower priced product for a rela-
tively higher priced product. Wheat/rice consumption can again be used to illustrate
this concept. Several regressions were run using data for the period 1957-67. One
used the consumption of rice as a function of (1) the price index of rice, (2) the
price index of flour (and products), (3) per capita expenditure, and (4) time, and
yielded the following result:

$$X_1 = 131.686 \quad - 134.109 \log X_4 + 133.649 \log X_5 \quad -9.795 \log X_7 + 5.572 \log X_8$$

$$R^2 = \ \ .94 \qquad t = \quad 6.298 \qquad\qquad 1.735 \qquad\qquad 0.270 \qquad\qquad 0.942$$

$$DW = \ \ 1.62 \qquad E = \ \ -.52 \qquad\qquad\quad .52 \qquad\qquad\quad .038$$

$$SE = \quad 1.59$$

Variables

X_1 = Per capita consumption of rice, kgs.

X_4 = Whole rice price index (1960=100).

X_5 = Wholesale price index of flour and flour products (1960=100).

X_7 = Per capita private consumption expenditure index deflated by
consumer price index (1960=100).

X_8 = Time (1957=1).
The student "t" values are right under the regression co-
efficients; a value over 2.4 indicates that the regression
coefficient differs significantly from zero at the 5 per-
cent probability level.

E = Elasticity computed at the means.

The direct and cross price effects are of the correct sign, indicating that rela-
tive price levels do have an effect on the consumption pattern of wheat and rice. The
size of the price coefficients also seem acceptable. Another example of price sub-
stitution is the recent increase in the use of wheat for feed in countries where stocks
have increased sharply, particularly in Western Europe, Canada, and the United States.
The following data for the United States show the wheat/corn price ratio and the
quantity of wheat fed for the crop years 1963-69: 33/

32/ Changes in consumption caused by price changes are the result of a substitution
effect, which is discussed in this section, and an income effect. Usually, the sub-
stitution effect is by far the stronger since a moderate increase in price does not
lower the consumer's income substantially (68).
33/ The wheat/corn ratio is the price of wheat per bushel divided by the price of
corn per bushel. Prices are the season averages received by farmers from (105). Wheat
fed taken from selected issues of (41).

Wheat/corn price ratio	Wheat fed
	Million tons
1963. . . . . . . 1.67	0.5
1964. . . . . . . 1.17	1.9
1965. . . . . . . 1.16	4.2
1966. . . . . . . 1.31	2.7
1967. . . . . . . 1.34	1.6
1968. . . . . . 1.15	4.7
1969. . . . . . 1.08	5.4

These data indicate that as the price difference between corn and wheat narrows, the amount of wheat going into feed increases. In 1963, when the price ratio was 1.67, only 0.5 million tons were fed; in 1969, with a ratio of only 1.08, an estimated 5.4 million tons were expected to be fed. The substitution effects of competing grains have been estimated and are accounted for in the projections models discussed in chapter VI.

Table 13.--Supply and availability of wheat by regions, average 1964/65-1966/67

Region		Area	Yield	Production	Change in stocks	Imports	Exports	Net trade	Availability	Per capita availability
		1,000 ha.	Kilos/ha.	1,000 metric tons						Kilos
Major exporters:										
United States	(USA)	20,127	1,760	35,478	-4,322	35	21,198	-21,163	18,637	95.8
Canada	(CAN)	1/11,831	1/1,590	18,846	839	0	13,848	-13,848	4,159	212.2
Argentina	(ARG)	5,201	1,510	7,862	-1,064	0	5,063	-5,063	3,863	172.8
Australia & N. Zealand	(ANZ)	1/7,668	1/1,330	10,207	2/1,148	138	6,477	-6,339	2,720	194.3
Developed importers:										
Japan	(JAP)	468	2,530	1,185	71	3,727	82	3,645	4,759	48.6
EC	(EC)	10,428	2,760	28,759	-232	4,391	5,679	-1,288	27,703	154.2
United Kingdom	(UK)	942	4,050	3,813	-24	4,343	14	4,329	8,166	149.6
Other Western Europe	(OWE)	7,063	1,140	10,202	41	1,908	568	1,340	11,501	131.2
South Africa, Rep. of.	(SAF)	1,180	650	770	-	367	1	366	1,136	63.6
Central plan countries:										
USSR	(SUN)	69,362	910	63,067	-	4,903	2,495	2,408	65,475	283.9
Eastern Europe	(EEU)	10,073	2,070	20,848	-	6,294	579	5,715	26,563	218.5
Communist Asia	(CAS)	25,000	920	22,933	-	5,733	11	5,722	28,655	36.0
Less developed:										
Central Am. & Caribbean.	(CAM)	3/798	3/2,520	1,894	-	1,280	304	976	2,870	35.8
East South America	(ESA)	796	1,010	803	-	3,087	77	3,010	3,813	39.7
West South America	(WSA)	1,220	1,320	1,615	-	1,221	0	1,221	2,836	59.5
North Africa	(NAF)	5,325	770	4,120	-	3,647	76	3,571	7,691	103.1
West Africa	(WAF)	-	-	26	-	658	31	627	653	4.9
East Africa	(EAF)	-	-	484	-	322	17	305	789	9.3
West Asia	(WAS)	2,027	1,040	12,475	-	2,048	101	1,947	14,422	164.1
South Asia	(SAS)	5/18,510	5/810	17,311	-	9,346	3	9,343	26,654	41.8
Southeast Asia	(SEA)	6/125	6/590	6/74	-	187	8	179	253	3.1
East Asia & Pacific.	(EAP)	7/162	7/2,040	7/332	-	2,141	63	2,078	2,410	12.1

1/ Seed area basis. 2/ Australia only. 3/ Mexico and Guatemala only. 4/ Mexico only. 5/ India and Pakistan only. 6/ Burma only. 7/ South Korea and Taiwan only.

Note: Dash indicates data not available in comparable form.

Table 14.--Wheat per capita availability by regions, averages
1954/55-1956/57 and 1964/65-1966/67

Region	1954/55-1956/57	1964/65-1966/67
	- - - - - - - Kilograms - - - - - - -	
Major exporters:		
United States.	98.6	95.8
Canada	273.8	212.2
Argentina.	183.9	172.8
Australia & New Zealand. .	205.0	194.3
Developed importers:		
Japan.	40.2	48.6
EC	1/149.4	154.2
United Kingdom	157.0	149.6
Other Western Europe . . .	133.6	131.2
South Africa, Rep. of. . .	63.3	60.6
Central plan countries:		
USSR	215.0	283.9
Eastern Europe	139.9	218.5
Communist Asia	37.4	36.0
Less developed:		
Central America & Caribbean	29.5	35.8
East South America	43.2	39.7
West South America	58.0	59.5
North Africa	85.3	103.1
West Africa.	3.3	4.9
East Africa.	7.2	9.3
West Asia.	155.9	164.1
South Asia	30.8	41.8
Southeast Asia	2.6	3.1
East Asia & Pacific. . . .	9.5	12.1

1/ 1955/56-1956/57 average.

Table 15.--World wheat availability by regions, 1955/56-1968/69

July/June year

1,000 metric tons

Region	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
United States	16,431	16,020	16,103	16,564	16,246	16,422	16,548	15,794	16,016	17,520	19,900	18,540	17,637	20,509
Canada	4,905	3,825	4,409	4,428	4,314	4,393	3,762	3,802	4,183	4,108	4,145	4,185	4,665	4,367
Argentina	3,048	3,585	3,270	4,324	4,238	3,342	4,165	3,214	3,985	4,584	2,519	4,487	3,379	4,279
Australia & New Zealand	2,269	2,452	2,587	2,361	2,349	2,712	2,293	2,409	2,571	2,761	2,937	2,461	3,291	2,940
Major exporters	26,653	25,882	26,369	27,677	27,147	26,869	26,768	25,219	26,755	28,973	29,501	29,673	28,972	32,095
Japan	3,631	3,638	3,669	3,752	3,832	4,134	4,290	4,454	4,802	4,568	4,606	5,142	4,861	-
EC	25,500	23,697	26,280	26,647	24,427	27,005	26,807	27,595	26,732	27,801	27,752	27,556	28,083	29,183
United Kingdom	7,798	7,990	7,858	7,891	7,367	7,694	7,256	8,105	7,534	8,080	8,660	7,720	7,870	8,058
Other Western Europe	10,450	11,048	11,163	11,164	11,331	11,286	11,064	12,231	10,648	11,480	11,290	11,575	11,993	11,738
South Africa, Rep. of	984	903	793	842	1,027	845	960	942	1,048	1,213	831	1,366	1,304	1,273
Developed importers	48,363	47,276	49,763	50,296	47,984	50,964	50,377	53,327	50,764	53,142	53,139	53,359	54,111	-
USSR	41,354	49,705	46,206	56,946	46,258	41,420	47,210	49,070	47,577	59,197	53,486	85,557	60,450	72,600
Eastern Europe	17,420	15,796	20,766	19,390	23,090	21,468	22,063	23,190	23,718	24,526	28,149	27,015	28,360	28,836
Communist Asia	23,000	24,800	23,670	24,055	24,315	24,300	21,220	25,016	27,065	30,636	29,121	26,210	27,186	25,500
Central plan countries	81,774	90,301	90,642	100,391	93,663	87,188	90,493	97,276	98,360	114,359	110,756	138,782	115,996	126,936
Cent. Amer. & Caribbean	1,729	2,010	2,219	2,187	2,234	2,043	2,464	2,857	2,531	2,803	2,984	2,919	3,288	-
East South America	3,208	3,156	2,945	3,053	3,089	3,089	3,405	3,572	2,719	3,927	3,576	3,936	3,919	-
West South America	2,143	2,086	1,708	2,196	2,282	2,265	2,434	2,373	2,613	2,635	2,862	2,964	2,969	-
North Africa	4,533	5,604	5,258	6,229	6,152	6,459	6,419	7,212	7,228	7,226	7,597	8,252	9,160	-
West Africa	316	392	370	353	375	374	464	387	402	479	662	822	-	-
East Africa	470	526	540	551	600	600	624	694	710	647	719	977	902	-
West Asia	10,754	11,287	13,026	11,690	11,888	13,154	13,310	13,958	14,258	13,516	14,731	14,894	16,924	-
South Asia	14,996	17,447	19,352	18,176	20,900	21,705	21,340	24,105	23,073	25,253	28,237	25,294	27,677	-
Southeast Asia	138	206	112	185	177	190	181	205	219	192	263	307	261	-
East Asia & Pacific	1,343	1,754	1,755	1,673	2,135	1,978	1,958	2,403	2,500	2,334	2,508	2,386	3,162	-
Less developed	39,630	44,468	47,285	46,293	49,530	51,870	52,599	57,766	56,253	58,912	64,139	62,751	-	-
Total world	196,420	207,927	214,059	224,657	218,324	216,891	220,237	233,588	232,132	255,386	257,535	284,565	-	-

Note: Dash indicates data not available.

Table 16.--Wheat per capita availability by regions, 1955/56-1968/69 1/

Region	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69
							Kilograms							
Major exporters:														
United States.	99.0	94.8	93.6	94.7	91.4	90.9	90.1	84.6	84.6	91.2	102.3	94.2	88.3	101.3
Canada	311.7	237.2	264.4	258.6	246.2	245.3	205.9	204.4	221.0	213.2	211.4	209.6	229.6	211.1
Argentina.	161.3	186.2	166.7	216.4	208.5	161.7	198.2	150.5	183.7	208.2	112.7	197.7	146.3	182.2
Australia & New Zealand	200.2	211.1	218.0	194.7	189.6	214.4	177.4	182.6	191.1	201.1	209.8	173.1	227.3	199.6
Developed importers:														
Japan.	40.8	40.4	40.4	41.0	41.6	44.4	45.6	46.9	50.1	47.1	47.1	52.1	48.8	-
EC	155.5	143.2	157.3	158.0	161.1	157.3	154.6	157.3	150.5	154.8	152.8	150.8	152.7	157.6
United Kingdom . . .	152.2	155.4	152.1	152.1	141.2	146.4	137.1	151.6	140.0	149.0	158.6	140.4	142.1	144.4
Other Western Europe .	128.8	135.3	135.7	134.7	135.7	134.1	130.4	142.9	123.3	132.0	128.8	131.1	134.9	131.1
South Africa, Rep. of.	69.8	62.6	53.6	55.5	66.1	53.1	59.0	56.6	61.5	69.5	46.5	74.7	69.0	65.5
Central plan countries:														
USSR	210.8	249.0	227.4	275.3	219.7	193.3	216.6	221.6	211.7	260.0	231.9	366.5	255.8	303.4
Eastern Europe . . .	155.7	139.9	182.4	168.9	199.3	183.9	187.4	195.9	198.3	203.5	231.8	220.6	229.2	231.0
Communist Asia . . .	36.2	38.1	35.5	35.3	34.9	34.0	29.1	33.6	35.5	39.3	36.6	32.2	32.8	30.2
Less developed:														
Cent. America & Caribbean	29.1	32.9	35.3	33.8	33.5	29.8	34.8	39.2	33.7	36.1	37.3	35.3	38.6	-
East South America . .	45.0	42.9	38.9	39.1	38.4	38.8	39.9	40.6	30.0	42.1	37.2	39.9	38.5	-
West South America . .	59.2	56.1	44.7	56.6	56.6	54.7	57.2	54.2	58.1	56.9	60.1	60.5	59.0	-
North Africa	77.7	93.8	85.9	99.3	95.7	98.2	95.1	104.2	101.9	99.2	101.5	107.7	116.0	-
West Africa.	3.1	3.7	3.4	3.2	3.3	3.2	3.9	3.2	3.2	3.7	5.0	6.0	-	-
East Africa.	6.9	7.5	7.6	7.6	8.1	7.9	8.0	8.7	8.7	7.8	8.5	11.3	10.2	-
West Asia.	160.5	164.4	183.3	160.2	158.5	170.6	168.3	172.0	171.1	157.9	167.6	165.3	183.2	-
South Asia	29.4	33.6	36.5	33.5	37.7	38.3	36.8	40.6	37.9	40.5	44.2	38.7	41.3	-
Southeast Asia . . .	2.2	3.2	1.7	2.7	2.5	2.7	2.5	2.7	2.8	2.4	3.2	3.7	3.1	-
East Asia & Pacific. .	8.8	11.2	10.9	10.1	12.6	11.3	10.9	13.1	13.3	12.1	12.6	11.7	15.1	-

Note: Dash indicates data not available.

1/ Some of the sharp annual fluctuations are due to unaccounted stock changes.

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Table 17.--Income and price elasticities of demand for wheat reported in studies, by country or region

Country and reference	Period studied	Income elasticity	Price elasticity	Trend	Comments
United States:					
(94)............	1950-62	-0.35	-0.35		Food use.
(12)............	1955-57	0	-0.16	0.11	Assumed: Trend is percent per year due to time and population.
(85)............	1955-66	-.30			Food use, Log Inverse.
Canada:					
(94)............	1950-62	-0.08	-0.26		Food use.
FRAD............	1951-66	+0.50	-1.00		All uses.
FRAD............	1951-66	0.16	-0.07		Food use.
(85)............	1955-66	-0.40			Food use, Log Inverse.
Argentina:					
(94)............	1950-62	-0.26	-1.48		Total use.
FRAD............	1951-66	-0.77	-0.28		Total use.
Australia:					
(94)............	1950-62	-0.59	-0.20		Food use.
(25)............	1947-63	+0.22	-0.65		Food use.
(85)............	1955-66	-0.60			Total use.
South Africa, Rep. of:					
(5).............	1946-65	0.35	0.3		Food use.
Japan:					
(94)............	1950-52	0.50	-1.50		All uses.
(94)............	1950-52	0.35	-0.14		Food use.
(85)............	1955-66	0.30			
United Kingdom:					
(94)............	1950-52	-0.37	-0.29		Food use.
(94)............	1950-52	-0.01	-0.33		All uses.
(85)............	1955-66	-0.60			
(64)............	1950-61	-0.20			
France:					
(94)............	1950-52	-0.26	-0.11		Food use.
(16)............	1950-60	-0.25	-0.36		Bread and other flour products.
(85)............	1955-66	-0.45			Food use.
Germany:					
(94)............	1950-52	-0.50			Food use, Log Inverse.
(85)............	1955-66				
Italy:					
(85)............	1955-66	-0.10			Food use, Log Inverse.
Netherlands:					
(85)............	1955-66	-0.50			Food use, Log Inverse.
Belgium:					
(85)............	1955-66	-0.40			Food use, Log Inverse.
Austria:					
(7).............	1950-59	0.01			Food use.
(85)............	1955-65	-0.05			Food use: for projections.
(30)............	1955-66	-0.30			
Denmark:					
(1).............	1953-65	-0.08	-0.13		Food use.
(85)............	1955-65	-0.14			Food use: for projections.
(30)............	1955-65	-0.20			Food use.
Finland:					
(85)............	1955-65	-0.65			Food use.
(30)............	1955-66	-0.20			Food use.
Greece:					
(85)............	1955-65	-0.20			Food use: for projections.

PERCENTAGES OF PROTEIN IN WHEAT USED IN DIFFERENT END PRODUCTS

Whole wheat bread

Heorth bread

Mocarani & egg noodles (U.S.)

White bread

All purpase flaur

Noudles (Oriental)

Crackers

Pie crust & daughnuts

Caokies

Cake

PERCENTAGE OF PROTEIN IN WHEAT
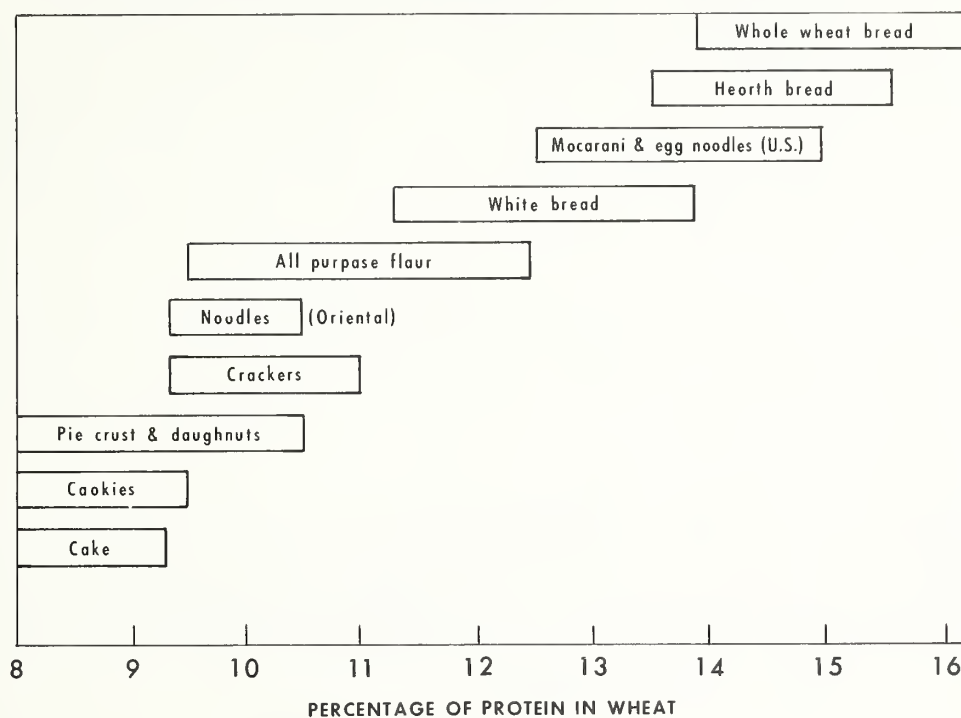
SOURCE: (87).

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Figure 7

WHEAT AVAILABILITY AND PER CAPITA INCOME BY REGIONS, AVERAGE 1964/65-1966/67

PER CAPITA AVAILABILITY (Kilograms)
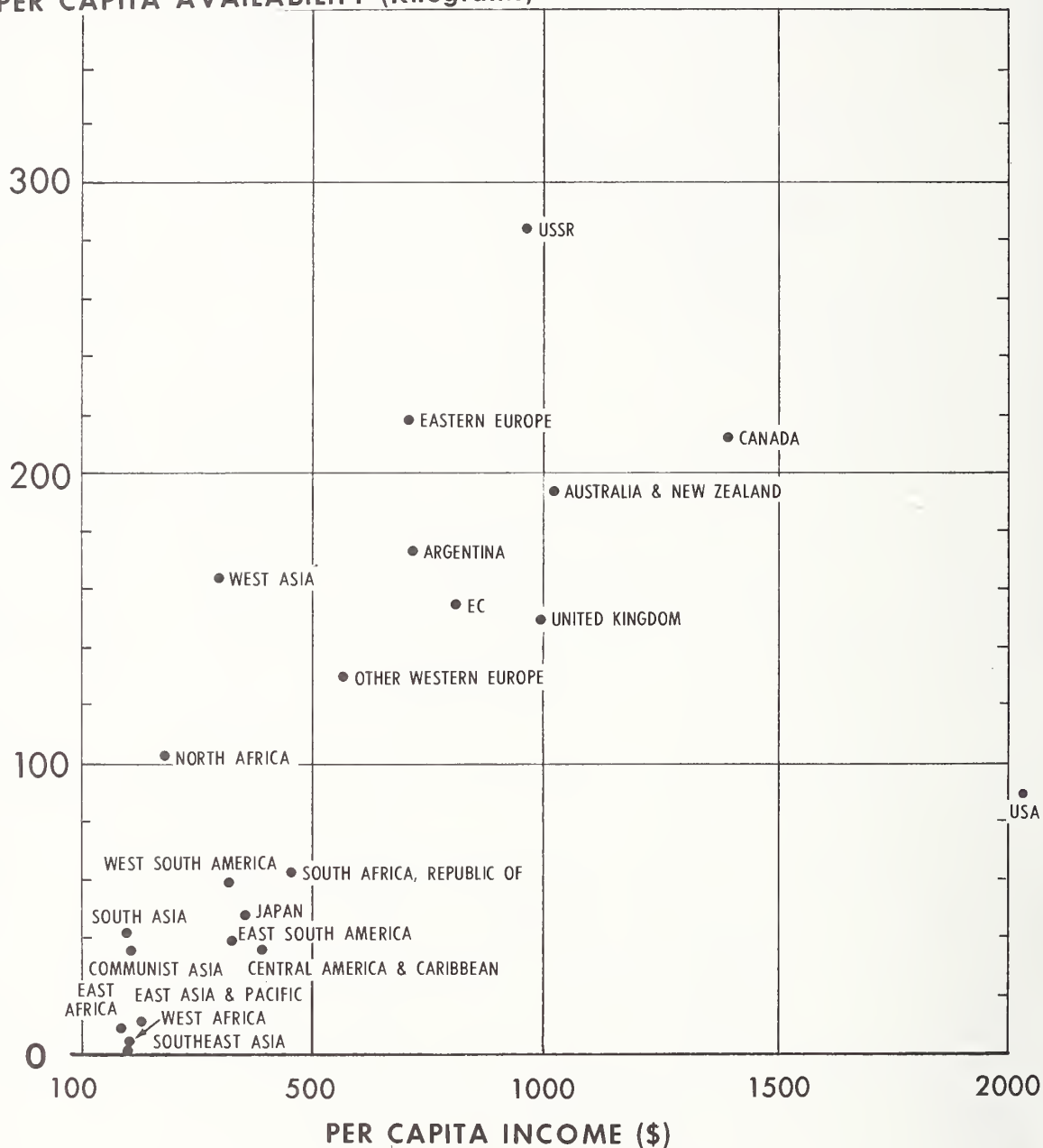
Figure 8

Trade which, like blood, should circularly flow. --Dryden

Wheat is by far the most widely traded food internationally. It is also the most highly commercial grain crop in the world; in recent years, international trade was equal to around one-fifth of the world's wheat crop (87). Wheat trade has supplemented domestic supplies of some countries, has complemented supplies of others (for blending to improve milling and baking quality), and has been the only source of supply for non-producing countries. It has been the major commodity in food aid programs to countries which do not have the means to import under normal commercial terms.

This chapter provides a perspective for wheat trade, using 1964-66 as a period of reference; and it discusses changes in the historical patterns of trade. The cases where the 1964-66 situation was clearly abnormal are noted. It now appears that import demand during this period was unusually strong because of poor crops in two major areas, the Soviet Union and South Asia. Some recent developments, which have altered the course of trade, will be discussed.

Nearly all major classes of wheat, including hard, soft, and durum, enter world trade (table 18). Because the characteristics of these classes differ, trade responds to different demands in different regions. Over time, the composition of world trade by classes has changed. The hard wheats comprise the largest part, but their share declined from about four-fifths in the midfifties to two-thirds in the midsixties. The share of soft wheats increased from one-fifth to one-third during the same period. One reason for the shift was rising soft wheat exports to the LDC's (54).

International wheat trade may generally be described as an oligopoly, or a system of a few sellers and many buyers. Since World War II, the framework of the pricing system has been set, to a large extent, by international agreement; first, the International Wheat Agreement, and more recently, the International Grains Arrangement (see ch. V).

Wheat flour is included as wheat in this chapter, though this element of world wheat trade has important characteristics of its own. From a literal point of view, flour is a separate commodity, but for the purposes of this report it is more meaningful to consider all wheat products in terms of grain equivalent. During the 1960's, there was little absolute growth in flour trade. In recent years, flour has accounted for around 10 percent of total wheat trade. The exporters are chiefly developed countries-- mainly, the United States, Canada, France, West Germany, Italy, Australia, and the Soviet Union. Shipments to the developed area have declined in recent years, but exports to the LDC's have been increasing; however, this rise has been due mainly to shipments under U.S. food aid programs. In non-wheat-producing countries, where the consumption of flour is increasing, there has been a general trend to establish a domestic milling industry, causing a switch in imports from flour to wheat. In countries with established flour milling industries, import policy generally tends to be protective, favoring wheat in lieu of flour (54).

Major Markets

During 1964-66, world wheat and wheat flour imports averaged 57.4 million tons (table 19). Of this total, the LDC's accounted for 40 percent; the Communist area,

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34/ Trade data in this section are calendar year for the most part and include flour in wheat equivalent. The regional classification and much of the data are given in (71).

34 percent; and the developed countries, 26 percent (table 21).

Imports by the Communist area during this period were unusually large because of Soviet purchases resulting from two poor grain harvests in 1963 and 1965. Imports by the Soviet Union averaged 7.6 million tons in 1964-66, compared with only 1.1 million tons during the preceding 3 years. In 1961-63, the Communist area as a whole accounted for only 10 percent of world imports.

Imports of the developed area were concentrated in three commercial market regions --Japan, the European Community, and the European Free Trade Association (EFTA).

In 1964-66, Japan's imports of 3.7 million tons accounted for 6.5 percent of the world total; the EC's imports of 4.5 million tons accounted for 7.8 percent; and EFTA's 5.7 million tons, for 9.9 percent. West Germany and the Netherlands were the largest country markets in the EC, although the other member countries imported substantial quantities. In EFTA, the United Kingdom was by far the largest market.

In the LDC's, three of the nine regions--South Asia, Latin America, and North Africa--accounted for three-fourths of wheat imports. And the imports of only four countries--India, Pakistan, Brazil, and the United Arab Republic--accounted for 55 percent of imports by the LDC's, as shown below:

	1,000 tons	Percent 1/
India.	6,648	29.2
Pakistan . . .	1,456	6.3
Brazil	2,311	10.1
UAR.	2,081	9.1
Total . . .	12,496	54.8

1/ Percentage of wheat imports by the LDC's.

It should be noted that import needs of India and Pakistan during 1964-66 were un-usually large because of poor harvests during the severe drought years of 1965 and 1966.

The bulk of world imports originate in the United States, Canada, Australia, Argentina, France, and the USSR. These suppliers accounted for about 95 percent of world wheat trade in 1964-66. Apart from imports supplied by Argentina, nearly all of the world's wheat imports originated in the developed area.

During 1964-66, the developed countries purchased five-sixths of their imports from the United States, Canada, Australia, and Argentina. In terms of quantity, ship-ments from these four countries amounted to the following:

	1,000 tons
United States.	4,490
Canada	5,362
Australia.	1,442
Argentina.	1,200
Total.	12,494

The remaining one-sixth came mostly from European countries (chiefly France).

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In the Japanese market, the United States and Canada were the major suppliers, accounting for 52 percent and 36 percent of the imports, respectively; Australia accounted for nearly all of the remainder (table 22). In the EC, the United States, Canada, and Argentina supplied just over three-fourths of the imports; intra-Community trade (mainly from France) accounted for most of the remainder. Over half of EFTA's imports, which are mainly U.K. purchases, originated in Canada and Australia. These two Commonwealth members accounted for 43 and 12 percent of the purchases, respectively; the United States accounted for 15 percent and the EC for 22 percent.

As mentioned previously, 1964-66 was a period in which the Soviet Union purchased very large quantities of wheat. Canada was by far its largest supplier, accounting for 57 percent of Soviet imports; other countries supplying significant amounts were: Australia, 12 percent; the EC (mainly France), 11 percent; Argentina, 10 percent; and the United States, 8 percent.

Eastern Europe's imports, which averaged 6.4 million tons in 1964-66, came from the Soviet Union (28 percent), the United States (24 percent), the EC (21 percent), and Canada (20 percent).

Imports by Communist Asia 35/ of 5.8 million tons came mainly from three countries --Australia, Canada, and Argentina, accounting for 37, 35, and 23 percent, respectively.

In the less developed area, wheat trade comes from the developed exporters almost exclusively, except for Argentina. A distinguishing characteristic of this area's imports is that well over half the 22.8 million tons imported in 1964-66 were under special transactions, mainly food assistance programs. 36/ Because of its food aid program (P.L. 480), the United States is by far the largest supplier, accounting for two-thirds of the 1964-66 imports of the LDC's.

In South Asia, where imports totaled 8.5 million tons, the United States supplied 86 percent; Australia and Canada accounted for 6 percent each. In Latin America, the United States supplied 47 percent of the total 6.0 million tons; other major suppliers were Argentina, with 27 percent, and Canada, with 16 percent. The Soviet Union was also a supplier in Latin America (largely Cuba), providing 8 percent of the total.

The United States was the major supplier in North Africa, providing 70 percent of the total imports of 3.4 million tons. The EC (mainly France) was the other large supplier to this region, accounting for 24 percent of total imports.

In West Asia, the United States and Australia were the two major suppliers, accounting for 62 and 24 percent of the 1.8 million tons of imports. In other countries in East Asia (mainly South Korea, Taiwan, and the Philippines), the United States supplied nearly three-fourths of total imports; Canada and Australia were the other main suppliers, accounting for 12 and 8 percent of total imports, respectively.

35/ For all practical purposes, Mainland China. 36/ The International Grains Arrangement definition of a special transaction is "one which whether or not within the price range, includes features introduced by the Government of a country concerned which does not conform with usual commercial practices." See art. 3 in (62). According to IWC compilations, in 1964-66, LDC's imports by special transaction averaged 13.3 million tons.

Major Exporters

A few countries account for the bulk of world wheat exports. The following list shows the six major exporters and their share of the market during 1964-66:

	1,000 tons	Percent
United States. . . .	21,747	37.9
Canada	14,773	25.8
Australia.	6,092	10.6
Argentina.	5,161	9.0
France	4,178	7.3
USSR	2,369	4.2
Total.	54,320	94.8

Together they accounted for 95 percent of world exports. 37/ The United States and Canada are distinctly the major suppliers, with 38 and 26 percent of total exports, respectively. Exports of Australia, Argentina, France, and the USSR ranged from 4 to 11 percent of the world total.

With the exception of Argentina, all major wheat suppliers can be classified as developed nations. Because wheat is not adaptable to the tropics, those countries primarily located in tropical or subtropical climates are precluded from wheat production (and exports).

However, many LDC's do raise wheat; the major producers are in North Africa, West Asia, and South Asia. 38/ Some of these countries--Mexico, Syria, Tunisia, and Morocco--have exported, but on a relatively small scale. 39/ In the 1960's, most of these countries imported wheat to supplement their domestic supplies.

The terms of trade offered by the major wheat exporters have been liberalized recently. According to compilations of the International Wheat Council, special transactions (see footnote 36, for definition), accounted for one-third of the volume of world trade during 1964/65-1966/67. The United States, through its Food for Peace Program (P.L. 480), accounted for the largest part of these sales. In fact, P.L. 480 sales comprised the largest part of U.S. wheat exports, accounting for nearly two-thirds of total U.S. shipments of wheat (40).

Changes in Historical Patterns

World levels and patterns of wheat trade have changed substantially in the past two decades. This may seem to be a trite statement, but it has particular relevance in view of the situation arising after the 1964-66 base period. It now appears that the strong import demand during the base period was unparalleled. The reasons for this,

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37/ The International Grains Arrangement includes Argentina, Australia, Canada, European Community, Greece, Mexico, Spain, Sweden, USSR, and the United States as exporting countries. For more information on the Arrangement, see ch. V. 38/ It is often surprising to note that in the midst of food problems in LDC's, there are large wheat producers among these countries. For instance, India, in 1964-66, was the world's 6th largest wheat-producing country; in 1968, the 5th; and, in 1969, the 4th, replacing Canada. 39/ Exports from North Africa and West Asia are mainly durum wheat which moves to European markets.

as well as other major trade developments occurring since the midfifties, are examined in this section.

The level of world trade increased sharply from 1955-57 to 1964-66, rising from an average of 30.5 million tons to 57.4 million tons (table 20). This is equivalent to an annual growth rate of 7.3 percent. But, if 1964-66 was a period of unusually strong demand, the growth in trade would be exaggerated. Using 1961-63 (44.5 million tons) in comparison results in an annual growth rate of 6.5 percent.

In addition, it should be noted that world wheat trade has dropped quite sharply since 1964-66. The Soviet Union has recovered from the poor crops of 1963 and 1965 and is virtually out of the international market as an importer. India and Pakistan harvested very good food grain crops in 1967/68 and 1968/69, so their import needs are down substantially.

There has also been a decided shift in the pattern of trade. Part of the shift may be temporary because of the unusual conditions prevailing in 1964-66.

During 1955-57 to 1964-66, imports by the developed regions dropped from 16.4 million tons and 54 percent of the world total to 14.9 million tons and 26 percent. This decline was due to increased wheat production and a subsequent falloff in import demand in Western Europe, even though imports by Japan, the other major developed importer, increased from 2.3 to 3.7 million tons.

The Communist area's share of world imports more than doubled during the same period, from 15 to 34 percent, as a result of large purchases made by the Soviet Union and Mainland China. Though Soviet imports stemmed from poor harvests in 1963 and 1965, Mainland China's imports have been between 4 and 6 million tons regularly since 1961, when the country began an import policy.

From 1955-57 to 1964-66, the LDC's imports jumped sharply, from 9.5 million tons (31 percent of world imports) to 22.8 million (40 percent of the world total). South Asia and North Africa accounted for this shift.

The developed exporters, whose shipments rose from 23.8 to 49.3 million tons, accounted for most of the increase in world trade during 1955-57 to 1964-66. U.S. exports more than doubled; Canada's nearly doubled; the EC's were up 130 percent; and Australia's jumped about 120 percent. As a result, the share of trade for these exporters increased from 78 percent to 86 percent.

Though exports from the LDC's increased from 3.7 to 5.5 million tons, most of the gain was contributed by a single country, Argentina. On a relative basis, the area's exports dropped from 12 percent of the world total to 9 percent.

The Communist area's exports declined from 3.0 to 2.6 million tons, with the Soviet Union shifting to a net importing position. At the same time, Eastern Europe's shipments were down as a result of poor harvest during 1964-66.

From the standpoint of export earnings or import charges, LDC's suffered a net loss of foreign exchange. There was no upward trend for export earnings in this area except in Argentina. Mexico, the only other large LDC exporter, has adopted a policy of reducing exports (or surplus), since selling at world prices requires a substantial subsidy because of higher domestic prices (47).

Developments in wheat trade since the 1964-66 reference period can generally be summarized as follows: a dropoff in the import demand of the USSR and South Asia, which has been reflected in a decline in world trade--particularly in U.S. and Canadian exports. The decline in the USSR's and South Asia's import demand stems mainly from

their supply situation. Production in the Soviet Union has recovered from the 1963 and 1965 droughts, and changes in the use of inputs and in price policy have given output an additional boost. South Asia's production has responded very rapidly to high-yielding grain varieties and larger application of inputs, both part of the technology of the "Green Revolution."

Table 18.--World wheat exports by major classes, 1956/57-1966/67

Total and share	Durum	Hard springs	Hard winters	Medium hard 2/	Soft	Total
	- - - - - - - - - -Million metric tons- - - - - - - - - -					
Total:						
1956/57. . . . . :	1.07	11.18	4.96	7.34	5.51	30.06
1957/58. . . . . :	.90	10.68	4.02	6.22	4.70	26.51
1958/59. . . . . :	.75	9.64	5.28	8.60	4.40	28.66
1959/60. . . . . :	.80	10.00	5.89	7.32	5.77	29.78
1960/61. . . . . :	1.35	11.54	9.48	6.26	7.50	36.14
1961/62. . . . . :	.62	9.27	10.78	7.09	12.80	40.56
1962/63. . . . . :	.63	8.24	9.33	7.14	12.30	37.64
1963/64. . . . . :	1.43	14.90	12.87	4.06	16.92	50.18
1964/65. . . . . :	1.13	9.41	12.06	5.58	16.40	44.58
1965/66. . . . . :	1.84	15.59	14.44	10.15	16.10	58.12
1966/67. . . . . :	2.00	15.33	8.32	6.58	16.54	48.77
	- - - - - - - - - - - - - -Percent- - - - - - - - - - - - - -					
Share of total:						
1956/57. . . . . :	4	37	17	24	18	100
1957/58. . . . . :	4	40	15	23	18	100
1958/59. . . . . :	3	34	18	30	15	100
1959/60. . . . . :	3	34	20	24	19	100
1960/61. . . . . :	4	32	26	17	21	100
1961/62. . . . . :	2	23	27	17	31	100
1962/63. . . . . :	2	22	25	19	32	100
1963/64. . . . . :	3	29	26	8	34	100
1964/65. . . . . :	2	21	27	13	37	100
1965/66. . . . . :	3	27	25	17	28	100
1966/67. . . . . :	4	31	17	14	34	100

1/ Excludes wheat flour.   2/ Mainly from Argentina.

Source: (54).

Table 19.—World trade in wheat and wheat flour in wheat equivalent, average 1964-66,

Exporting regions	Developed								Communist		Free less developed									World total exports
	United States	Canada	Japan	EEC	EFTA	OWE	Australia N.Z. S. Africa Rep. of	East. Europe	USSR	Communist Asia	Latin America	North 1/	Africa: West	Africa: East	Asia: West	Asia: South	Asia: South-east	Other East	Far East & Oceania	
											1,000 metric tons 1/									
United States	—	—	1,957	1,338	837	205	153	1,531	595	—	2,820	2,387	189	57	1,128	7,285	163	1,090	12	21,747
Canada	45	—	1,345	1,308	2,464	132	68	1,267	4,320	2,003	963	4	83	2	26	489	17	183	54	14,773
Japan	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	34	30	69
EC	—	—	9	730	1,228	74	—	1,357	844	217	141	798	232	80	155	116	5	29	38	6,053
EFTA	—	—	—	73	101	4	—	222	—	—	—	—	—	4	—	1	—	5	—	410
Other Western Europe	—	—	—	33	48	—	—	—	—	—	—	43	—	—	8	—	—	—	—	132
Australia, New Zealand & So. Africa, Rep. of:	—	—	426	40	692	88	196	4	870	2,133	4	19	—	179	432	549	25	119	316	6,092
Total developed	45	—	3,737	3,522	5,370	503	417	4,381	6,629	4,353	3,928	3,251	504	322	1,749	8,440	215	1,460	450	49,276
Eastern Europe	—	—	—	3	—	2	—	10	112	—	10	23	—	—	—	9	—	—	—	169
USSR	—	—	—	—	—	23	—	1,757	—	51	485	50	—	—	—	3	—	—	—	2,369
Communist Asia	—	—	—	—	—	—	—	—	54	—	—	—	—	—	—	2	—	1	—	57
Latin America	—	—	1	831	306	54	8	217	771	1,347	1,623	57	3	12	30	6	—	4	—	5,270
North Africa	—	—	—	85	—	—	—	4	—	—	—	13	1	—	—	—	—	—	—	103
West Africa	—	—	—	1	2	—	—	—	—	—	—	—	—	13	—	—	—	—	—	16
East Africa	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—	—	4
West Asia	—	—	—	15	—	—	—	—	—	—	—	5	—	—	33	1	—	—	—	54
South Asia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	3
Southeast Asia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other East Asia	—	—	—	—	—	1	—	—	—	—	—	—	—	—	3	5	—	22	20	51
Far East Asia & Oceania	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	37	40
World total imports	45	—	3,738	4,457	5,678	583	425	6,369	7,566	5,751	6,046	3,399	508	351	1,815	8,466	221	1,487	507	57,412

Note: Dash indicates no trade or trade of less than 500 metric tons.

Source: (71) updated.

Table 20.--World wheat imports and exports by regions, averages 1955-66

Region	Exports				Imports			
	1955-57	1958-60	1961-63	1964-66	1955-57	1958-60	1961-63	1964-66
	-1,000 metric tons-							
United States.	10,424	12,482	18,067	21,747	235	221	153	45
Canada .	7,629	8,096	10,227	14,773	2	2	-	-
Japan.	17	25	85	69	2,327	2,520	2,896	3,738
EC .	2,629	3,079	3,231	6,053	5,759	4,579	5,515	4,457
EFTA .	233	119	442	410	6,652	6,196	5,763	5,678
Other Western Europe .	35	250	240	132	996	729	1,251	583
Australia, New Zealand, & South Africa, Rep. of .	2,788	2,413	5,640	6,092	383	401	340	425
Total developed area .	23,755	26,465	37,932	49,276	16,354	14,648	15,918	14,926
Eastern Europe .	235	256	177	169	4,418	4,160	5,508	6,369
USSR .	2,814	3,950	4,273	2,369	179	181	1,075	7,566
Communist Asia .	-	53	1	57	30	90	4,569	5,751
Total Communist area .	3,049	4,259	4,451	2,595	4,627	4,431	11,152	19,686
Latin America.	3,076	2,393	1,852	5,270	3,401	3,803	4,558	6,046
North Africa .	361	328	91	103	809	2,028	2,908	3,399
West Africa.	-	-	9	16	300	415	570	508
East Africa.	-	-	4	4	170	227	264	351
West Asia.	233	217	99	54	1,263	1,485	2,215	1,815
South Asia .	-	-	-	3	2,026	4,984	4,627	8,466
Southeast Asia .	-	-	-	-	121	139	206	221
Other East Asia .	-	4	31	51	924	1,124	1,511	1,487
Far East & Oceania .	-	102	1	40	475	455	541	508
Total less developed area.	6,670	3,044	2,087	5,541	9,489	14,660	17,400	22,800
Total world.	30,474	33,769	44,470	57,412	30,474	33,769	44,470	57,412

Note: Dash indicates no trade or trade of less than 500 metric tons.

Source: (71) updated.

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Table 21.--Share of world wheat imports and exports by regions, averages 1955-66

Region	Exports				Imports			
	1955-57	1958-60	1961-63	1964-66	1955-57	1958-60	1961-63	1964-66
	-Percent-							
United States.	34.2	37.0	40.6	37.9	0.8	0.7	0.3	-
Canada	25.0	24.0	23.0	25.8	-	-	-	-
Japan.	0.1	0.1	0.2	0.1	7.6	7.6	6.5	6.5
EC	8.6	9.1	7.3	10.6	18.9	13.6	12.4	7.8
EFTA	0.8	0.4	1.0	0.7	21.8	18.2	13.0	9.9
Other Western Europe. . . .	0.1	0.7	0.5	0.3	3.3	2.2	2.8	1.0
Australia, New Zealand, & South Africa, Rep. of	9.1	7.1	12.7	10.6	1.3	1.2	.8	0.7
Total developed area	77.9	78.3	85.3	86.0	53.7	43.5	35.8	25.9
Eastern Europe	0.8	0.8	0.4	0.3	14.4	12.3	12.4	11.1
USSR	9.2	11.7	9.6	4.2	0.6	0.5	2.4	13.2
Communist Asia	-	0.2	-	0.1	0.1	0.3	10.3	10.0
Total Communist area	10.0	12.7	10.0	4.6	15.1	13.1	25.1	34.3
Latin America.	10.1	7.1	4.2	9.2	11.2	11.3	10.2	10.5
North Africa	1.2	1.0	0.2	0.2	2.7	6.0	6.5	5.9
West Africa.	-	-	-	-	1.0	1.2	1.3	0.9
East Africa.	-	-	-	-	0.6	.7	0.6	0.6
West Asia.	0.8	0.6	0.2	-	4.1	4.4	5.0	3.2
South Asia	-	-	-	-	6.6	14.8	10.4	14.8
Southeast Asia	-	-	-	-	0.4	0.4	0.5	0.4
Other East Asia.	-	-	0.1	-	3.0	3.3	3.4	2.6
Far East & Oceania	-	0.3	-	-	1.6	1.3	1.2	0.9
Total less developed area. . . .	12.1	9.0	4.7	9.4	31.2	43.4	39.1	39.8
Total world.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Dash indicates no trade or trade of less than 500 metric tons.

Source: (71) updated.

Table 22.--World trade in wheat and wheat flour in wheat equivalent as percentage of total imports of each region, average 1964-66

Importing regions

Exporting regions	Developed							Communist			Free less developed									World total exports
	United States	Canada	Japan	EC	EFTA	OWE	Australia, N.Z. & S. Afr. Rep. of	East. Europe	USSR	Communist Asia	Latin America	North (Africa)	West (Africa)	East (Africa)	West (Asia)	South (Asia)	South-east (Asia)	Other East (Asia)	Far East & Oceania	
United States	-	-	52.4	30.0	14.7	35.2	36.0	24.1	7.9	-	46.7	70.2	37.2	16.3	62.2	86.1	73.7	73.3	2.4	37.9
Canada	100.0	-	36.0	29.4	43.4	22.7	16.0	19.9	57.1	34.8	15.9	0.1	16.3	0.6	1.4	5.8	7.7	12.3	10.7	25.8
Japan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3	2.3	5.9	0.1
EC	-	-	0.2	16.4	21.6	12.7	-	21.3	11.1	3.8	2.3	23.5	45.7	22.8	8.5	1.4	2.3	2.0	7.5	10.6
EFTA	-	-	-	1.6	1.8	0.7	-	3.5	-	-	-	1.3	-	1.1	0.4	neg.	-	0.3	-	0.7
Other Western Europe	-	-	-	0.8	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Australia, New Zealand & So. Africa, Rep. of	-	-	11.4	0.9	12.2	15.1	46.1	neg.	11.5	37.1	neg.	0.5	-	51.0	23.8	6.5	11.3	8.0	62.3	10.6
Total developed	100.0	100.0	100.0	79.1	94.6	86.4	98.1	68.8	87.6	75.7	64.9	95.6	99.2	91.8	96.3	99.8	97.3	98.2	88.8	86.0
Eastern Europe	-	-	-	neg.	-	0.3	-	0.2	1.5	-	0.2	0.7	-	-	-	0.1	-	-	0.3	0.3
USSR	-	-	-	-	-	4.0	-	27.6	-	0.9	8.0	1.5	-	-	-	neg.	-	-	-	4.2
Communist Asia	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	0.1
Latin America	-	-	neg.	18.7	5.4	9.3	1.9	3.4	10.2	23.4	26.9	1.7	0.6	3.4	1.7	neg.	-	0.3	-	9.2
North Africa	-	-	-	-	-	-	-	neg.	-	-	-	0.4	-	-	-	-	-	-	-	0.2
West Africa	-	-	-	-	-	-	-	-	-	-	-	-	0.2	3.7	-	-	-	-	-	neg.
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	1.1	-	-	-	-	-	neg.
West Asia	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	1.8	-	-	-	-	neg.
South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	neg.	-	-	-	neg.
Southeast Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other East Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	2.7	1.5	3.9	neg.
Far East Asia & Oceania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.3	neg.
World total imports	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Dash indicates no trade or trade of less than 500 metric tons.

Source: (71) updated.

V.--TRADE POLICIES

> Any policy measure...is deemed good or desirable if it leads
> to an increase in real national income per head, provided it
> does not involve a change in the distribution of income that
> is...undesirable. --Gottfried Haberler

A common objective of most commodity trade policies throughout the world is price stabilization. Most often the effort is directed to producer prices, but for some importing countries policies may be geared to consumer prices as well. Policies may be restrictive or stimulative. Implementation of trade policies takes many forms--tariffs, levies, quotas, embargoes, standards and grades, subsidies, and concessions on terms of trade.

Wheat is one of the leading commodities in terms of national foreign trade policy formulation . In addition, it is one of the few commodities for which an international trade policy has been enacted. There are several reasons for this:

(1) Over time, nearly all wheat-producing countries have developed programs which in some way have supported the domestic price of wheat; trade policies have been enacted to safeguard or stabilize support levels.

(2) Wheat is the only food grain in large enough supply to effectively combat a major food crisis in the world. Therefore, food aid programs have been formulated to assist countries that lacked the means to purchase under normal commercial terms.

The following sections describe a few of the major policies affecting the trade of wheat. References discussing other policies are (32, 44).

The International Grains Arrangement 40/

International commodity agreements have met with varying degrees of success. 41/ The International Grains Arrangement (IGA) and its predecessor--the International Wheat Agreement (IWA)--are no exception. Already, the minimum price levels of the IGA have been tested and have failed to hold under the current world supply and demand situation for wheat. One is apt to conclude that this means the IGA has failed, and is another example of an ineffective international agreement. However, final judgment should perhaps be withheld until the 1971 harvest, for apart from its operational functions, the IGA does provide a forum for consultations and reviews of the situation and prospects for the world market. There is evidence now that supplying nations are taking steps to reduce excess supplies and it remains to be seen if they will be successful. When reading the following discussion on the IGA, one must keep in mind that world export prices, in early 1970, are well below the established minimums.

International trade in wheat has been subject to special trading agreements almost continuously since 1949. The first International Wheat Agreement (IWA) was effected on August 1, 1949; the last on August 1, 1962. The 1962 agreement was to expire on July 31, 1965, but because of the negotiations on the General Agreement on Tariffs and Trade (GATT), it was extended in 1965, 1966, and 1967. The last extension related only to its administrative provisions and excluded its substantive economic provisions.

40/ This section is based largely on an article appearing in (39). 41/ For a thorough discussion of international commodity arrangements and policies see (11).

The Kennedy Round of GATT negotiations, whose objective was to achieve a further reduction of import tariffs, began in April 1963. For grains, attention was on the formulation of a wider agreement covering world trade. Eleven countries (Argentina, Australia, Canada, Denmark, Finland, Japan, Norway, Sweden, Switzerland, the United Kingdom, and the United States) and the European Community took part in these discussions. Talks were concluded in May 1967.

Terms of the settlement on cereals in the final GATT agreement were set forth in a Memorandum of Agreement. Each signatory agreed to negotiate a grains arrangement containing the provisions set forth in the memorandum on as wide a basis as possible; to work diligently for the early conclusion of the negotiations; and to seek acceptance of the arrangement in accordance with that government's constitutional procedures. The provisions in the memorandum related to world trade in wheat and a program of food aid in grains.

At a special session on June 19 and 20, 1967, the International Wheat Council agreed to convene, in cooperation with the United Nations' Conference on Trade and Development, a conference pursuant to Article 36 (39) of the International Wheat Agreement in which all members of the United Nations or its specialized agencies were invited to participate on an equal basis. This negotiating conference, held in Rome from July 12 to August 18, 1967, was attended by representatives of 53 countries and the Economic Community. It established the International Grains Arrangement.

The IGA consists of two legal instruments--a Wheat Trade Convention and a Food Aid Convention. Each requires separate signature and ratification. All member countries of the United Nations or its specialized agencies can participate in one or both Conventions. The signatory governments of the GATT Memorandum of Agreement, however, must participate in both.

The Wheat Trade Convention and the Food Aid Convention entered into force on July 1, 1968, for a duration of 3 years.

As of July 1, 1968, 33 countries and the Economic Community had signed to participate in the Wheat Trade Convention and 17 countries and the EC had ratified or filed provisional application for membership in the Food Aid Convention.

Wheat Trade Convention

The Wheat Trade Convention as a stabilizing instrument for international trade uses the basic approach of the 1962 IWA with modifications.

The stabilization of prices within a prescribed price range remains a central objective of the Convention, but greater precision has been given by the establishment of minimum and maximum prices for 14 different wheats rather than only one as in the former wheat agreement.

The importing countries are committed to import not less than a stated percentage of their commercial purchases from members of the Convention. Exporters in association with one another are obligated to make available quantities of wheat sufficient to satisfy the commercial requirements of the importing countries. However, when world prices are at or above the maximum price, the collective supply obligation is subject to an annually adjusted quantitative limit referred to as a "datum quantity."

The Price Mechanism.--The price mechanism of the 1962 International Wheat Agreement consisted of a price range expressed in terms of a minimum and maximum price for one specific type of wheat (Manitoba No. 1 Northern) in one position (in store, Fort William/Port Arthur), with a formula for establishing equivalent minimum and maximum

prices for other Canadian or foreign ports of origin. The equivalent minimum prices for other ports were based on a formula which took account of prevailing freight rates. The formula was designed to make these prices equal in the U.K. market, or in the case of European exporters, equal in the country of destination. At the maximum of the range there were many exceptions whereby prices were simply equated with a Lakehead maximum for Canadian wheat rather than adjusted for prevailing freight costs. All prices were subject to further adjustment for quality differentials, which were not prescribed in the Agreement.

In the Wheat Trade Convention, modifications were made for the following reasons:

(a) Using an interior point in Canada as the basic point of origin led to some price distortions. The periods of closed navigation on the Great Lakes and the St. Lawrence and the inclusion of the higher internal transportation costs in Canada in the calculations increased virtually all equivalent prices for other wheats at the minimum, and for many at the maximum, by 10 to 12 cents a bushel. This abrupt increase reflected no similar conditions in other exporting countries and no necessary relationship to actual trading conditions. This led to the selection of the U.S. Gulf ports, a location open all year, as the basic point of origin.

(b) Equivalent prices for other locations are calculated using current freight rates. This formula was essentially retained from the IWA, although there are important changes in its application reflecting the increased importance of Rotterdam as a trading center and the growth of trade to Far Eastern markets. Under the IWA, for U.S., Australian, and Argentine ports, and for Canadian ports other than Fort William, equivalents were determined by using the United Kingdom as the base point of destination; in the Wheat Trade Convention, however, the United Kingdom is used only for determining equivalents at Australian ports. For other ports of origin, Rotterdam and Yokohama are the destination basing points. Furthermore, where the Yokohama destination point is used, the starting point is the Pacific Northwest rather than Gulf ports, since the Wheat Trade Convention provides that the entire price list, when transferred to the Pacific Northwest, is a flat 6 cents less than at Gulf ports.

(c) In earlier agreements, the world price range was specifically set forth only for No. 1 Northern Manitoba. Attempts to agree on premiums or discounts to give the exact minimums or maximums for other wheats had been unsuccessful. In the Wheat Trade Convention, there is no fixed single reference wheat. Rather than a set of fixed premiums or discount factors for different wheats, there is a listing of 14 different wheats with provisions for adding others and adjusting their relationship to one another whenever necessary.

The power to quickly agree upon and implement such adjustments or additions is given to a newly established Prices Review Committee. The adjustable and multiple-price concept represented by the new system and the language providing for related procedures is probably the most significant feature of the Wheat Trade Convention.

The Convention clearly recognizes that a given set of price relationships cannot always apply and that the set cannot be rigid. Prices of all types of wheats do not always fluctuate together. The new concept of the minimum recognizes that a country may be pricing below the minimum even before the Prices Review Committee is called to act. If committee conclusions are not satisfactory to all concerned, no exporting country should or can be precluded from maintaining its competitive position. In essence, the chief burden of upholding the composite world price floor falls upon members acting collectively in the Prices Review Committee rather than upon an individual exporter whose normal sales are being most restricted by the existing minimum price relationship.

The Range

The price range in the 1962 International Wheat Agreement was US$1.625 to US$2.025 per bushel for No. 1 Manitoba Northern in bulk, instore Fort William/Port Arthur, at the parity for the Canadian dollar determined for the purposes of the International Monetary Fund. The increase in the price level represented by the new range, broadly stated, is about 20 cents a bushel.

The prices incorporated in the Wheat Trade Convention are as follows:

| | Price range, basis U.S. Gulf ports | |
	US$ per bushel	US$ per ton
Argentina:		
Plate wheat.	1.73-2.13	63.50-78.26
Australia:		
Fair average quality	1.68-2.08	61.73-76.43
United States:		
Dark Northern Spring No. 1, 14 per-		
cent.	1.83-2.23	67.24-81.94
Hard Red Winter No. 2 (ordinary		
protein).	1.73-2.13	63.57-78.26
Western White No. 1.	1.68-2.08	61.73-76.43
Soft Red Winter No. 1.	1.60-2.00	58.79-73.49
Canada:		
Manitoba No. 1	1.955-2.355	71.83-86.53
Manitoba No. 3	1.90-2.30	69.81-84.51
Economic Community:		
Standard quality	1.50-1.90	55.12-69.81
Sweden	1.50-1.90	55.12-69.81
Greece	1.50-1.90	55.12-69.81
Spain:		
Fine wheat	1.60-2.00	58.79-73.49
Common wheat	1.50-1.90	55.12-69.81
Mexico:		
Wheat on sample or description,		
f.o.b. Mexican Pacific Ports or		
at the Mexican border	1.55-1.95	56.95-71.65

Durum wheat and certified seed wheat are excluded from the provisions relating to maximum prices. Denatured wheat is excluded from the provisions relating to minimum prices. The minimum and maximum prices of any wheat not specified will be derived from the minimum and maximum prices of the description, class, type, grade, or quality of wheat which is most closely comparable by the addition of an appropriate premium or by the deduction of an appropriate discount. Such premiums or discounts may be fixed and adjusted as necessary by the Prices Review Committee. However, no minimum or maximum price f.o.b. U.S. Gulf ports shall be higher than those for Manitoba Northern No. 1.

Prices of Wheat Flour.--The article relating to wheat flour was strengthened by provisions enabling countries which believe that their interests have been adversely

affected by distortions in wheat/flour price relationships to request consultations with the member countries concerned.

The Importer-Exporter Position.--The Wheat Trade Convention makes three changes affecting the role of member countries as importers or exporters:

(a) The Economic Community is included in the Convention as both an exporting and an importing country, having voting rights for each of these roles and a percentage obligation in respect to its imports.

(b) Greece, formerly an importing country, is now an exporter.

(c) Imports of wheat by importing countries which are bought from other importing countries will count against the percentage obligation of the country importing this wheat.

Datum Quantities.--Datum quantities, calculated for each crop year, represent the quantities which importers have the right to buy at prices not exceeding the maximum price during a crop year in which a maximum price declaration is made. In the 1962 IWA, these were equal to the average commercial purchases of each importing country from exporting member countries during the first 4 years of the immediately preceding 5 crop years. This principle has been maintained, but no datum quantities will be established for purchases from other member importing countries or from the Economic Community.

Experience has shown that for countries with expanding imports, datum quantities consistently lag behind current imports. For this reason some flexibility in the calculation of datum quantities was introduced in the Wheat Trade Convention for countries whose percentage undertaking is not less than 80 and whose purchases have increased to the extent that in at least 3 of the 4 years used, commercial imports were higher than the datum quantities calculated in the traditional manner. In such cases, the datum quantity for the importing country concerned will be based on the same 4 years but adding to the datum quantity as normally calculated the difference between the average annual purchase in these 4 years and the average datum quantities.

Percentage Obligation.--The percentage obligation in the 1962 IWA was the minimum proportion of total commercial purchases which importing countries undertook to import each crop year from exporting member countries. In the Wheat Trade Convention, commercial purchases by importers from any member country count towards the fulfillment of their obligations, and importers undertake to purchase in each crop year from member countries, whether exporters or importers, not less than a percentage established for each country in consultation with the International Wheat Council.

Trade with Nonmembers.--The price provisions of the 1962 IWA related only to the trade between member countries. In the Wheat Trade Convention, the obligation to trade at prices consistent with the price range also covers transactions with nonmember countries.

Guidelines Relating to Concessional Transactions.--The definitions of commercial and special transactions contained in Article 3 of the 1962 IWA were not amended. They are to be reviewed at an early date. A new article of the Convention, however, contains guidelines for concessional transactions applying to grains as a whole.

The first guideline is to conduct any concessional transaction so as to avoid harmful interference with normal patterns of production and international commercial trade. Concessional transactions are to be additional to the commercial import trade which could reasonably be anticipated. Compliance with this is to be consistent with the Principles of Surplus Disposal and Guiding Lines recommended by FAO. Measures may

include an agreement with the recipient country that it will maintain on a global basis a specified level of commercial imports of wheat. In reaching this agreement, full regard will be given to the commercial import levels in a representative period and to the economic circumstances of the recipient country, including its balance-of-payments position.

Member countries with concessional exports will consult with exporting member countries whose commercial sales might be affected. The Executive Committee of IWC will report annually to the Council on concessional transactions in wheat.

Other Provisions.--All other provisions--such as those relating to maximum price declarations; adjustments in case of short crops; necessity to safeguard the balance of payments or monetary reserves; additional purchases in case of critical needs; the reporting of transactions and price; estimates of requirements and availability of wheat; consultations; performance; defaults; actions in case of serious prejudice; disputes and complaints; and the annual review of the world grains situation--are in essence unchanged.

Food Aid Convention

Under this Convention, participating countries agreed to contribute wheat, coarse grain, or the cash equivalent thereof as aid to the less developed countries to an amount of 4.5 million tons of grain annually. The grains are to be suitable for human consumption and of an acceptable type and quality. The parties to the GATT Memorandum will supply 4,259,000 tons of this total, and it was hoped that additional countries signing the Food Aid Convention will bring the program to the 4.5 million tons.

A Food Aid Committee consisting of member countries has been established. Its function is to receive reports from contributing countries and to review the amounts and terms of contributions, whether in the form of grain, cash, or other assistance. The Committee will use the services of the Secretariat of the International Wheat Council for such administrative duties as the Committee may request.

The minimum contribution of each country which signed the GATT Memorandum is fixed as follows:

	Percent	1,000 tons
United States.	42.0	1,890
Canada	11.0	495
Australia.	5.0	225
Argentina.	0.5	23
EC	23.0	1,035
United Kingdom	5.0	225
Switzerland.	0.7	32
Sweden	1.2	54
Denmark.	0.6	27
Norway	0.3	14
Finland.	0.3	14
Japan.	5.0	225

The contributing countries can specify a recipient country or countries for their contribution under the food aid program.

Grain food aid can be supplied for the importing country's currency. This currency is generally not transferable and is not convertible for use by the donor country outside of the importing country. The contribution may be a gift of grain or a monetary grant used to purchase grain for the importing country. Grain purchases are to be

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made from participating countries but priority is to be given to the LDC's. At least 25 percent of the cash contributions (or a minimum purchase of 200,000 tons) is to be used for grains produced in the LDC's.

Regional Trade Associations

The Latin American Free Trade Association 42/

The Latin American Free Trade Association (LAFTA)--established by a treaty for economic cooperation between Mexico, Argentina, Brazil, Chile, Paraguay, Peru, and Uruguay in 1960, with membership later granted to Colombia, Ecuador, Venezuela, and Bolivia--is not a common market but aims at reciprocal reductions of duties and other restrictions to achieve free trade between member countries over a 12-year period. However, at the meeting of 20 Chiefs of State of the Organization of American States in April 1967, it was agreed that by 1985 intra-LAFTA trade would be free of duties and restrictions and a common external tariff achieved. The same meeting also resulted in an agreement to work toward one Latin American Common Market.

Many of the LAFTA trade preferences with member countries have been modified or nullified by the application of escape clauses or by state trading and bilateral agreements. In addition, exports have been maintained to traditional markets at the expense of intraregional trade. While trade has increased between member countries, large additional gains will require long-term efforts for the same reasons that have limited past gains and caused the stretchout in the LAFTA timetable of reductions. The negotiation problems will become more difficult as restrictions are progressively reduced.

Trade in agricultural commodities accounts for about two-thirds of total intra-LAFTA trade. LAFTA members supply nearly half their total agricultural imports. Wheat is the principal agricultural commodity imported, accounting for about 20 percent of intra-LAFTA trade excluding that with Bolivia and Venezuela. Argentina is the principal wheat supplier, and occasional exports come from Uruguay. Mexico has exported wheat in recent years. Brazil takes about three-fourths of intra-LAFTA imports of wheat.

Brazil, Peru, and Venezuela have no duties on wheat imports from LAFTA countries, and Chile and Colombia have reduced duties to LAFTA members substantially below those to other countries. However, LAFTA concessions have had little effect on intra-LAFTA wheat trade because government controls make the preference almost meaningless in most countries. Wheat imports are under government monopoly and are exempt from all duties in Brazil, Chile, Colombia, and Mexico. Peru's private sector has imported wheat, but the Government exempts imports from all duties. Venezuela permits wheat imports at a preferential rate.

The Central American Common Market 43/

The Central American Common Market (CACM)--established by a treaty for economic integration between Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua in 1960--attempted to provide for a common market and completely free internal trade by 1970.

Wheat is the principal agricultural commodity imported by the CACM, accounting for one-fourth of the region's total agricultural imports in 1966. The CACM produces very little wheat and must import almost all its requirements. Wheat and flour are among

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42/ Taken from (30), pp. 3-4 and (70), pp. 8, 21-25.
43/ Taken largely from (30), pg. 3; and (70).

the few remaining commodities for which there is no free trade within the CACM nor common external tariffs. This is partly because Guatemala, the only Central American country to produce much wheat, wants to protect its producers by maintaining high domestic prices and controlling trade.

European Community 44/

The EC sought to establish free intra-area trade in agricultural as well as industrial products and to establish common policies for agriculture. The Rome Treaty of 1957 lists the following agricultural policy objectives: (1) Increasing agricultural productivity, (2) maintaining a "fair standard of living" for the rural population, (3) stabilizing markets, (4) assuring regular supplies, and (5) maintaining "reasonable" consumer prices.

The first EC Council action toward achieving a common agricultural policy came in January 1962, when basic market regulations were issued for grain (except rice), poultry and eggs, hogs, fruit and vegetables, and wine. These regulations set the pattern for subsequent regulations for other commodities. New regulations for grains, pork, and poultry became effective on July 1, 1967, at the inception of common prices for these products.

Basic Features.--The Community program for supporting prices and regulating trade in grains is contained in a series of regulations setting up a common market organization. Except for rice, which is covered by separate regulations, all grains produced or imported into the Community, including flour and processed grain products, are covered. The grain marketing year extends from August 1 to July 31. For each marketing year, a series of prices are established which serve as the primary mechanism for influencing and regulating production and trade. No production restrictions are imposed.

The basic price for each of the important grains produced domestically is the target price. This is the wholesale price level goal for the respective grains in Duisburg, Germany, designated as the main marketing center of the major deficit area in the EC. The target prices and other administratively determined prices are fixed for a standard quality for each grain. The regulations provide that the target prices be set by the EC's Council of Ministers prior to August 1 for the marketing year beginning August 1 of the following year.

Since EC target prices are substantially higher than world prices, it is necessary to protect the domestic market from lower priced imports. To do this, a threshold price, which is the minimum import price, is established for Rotterdam at a level to ensure that imported grains may not be delivered to Duisburg at a price lower than the target price, taking into consideration quality differentials. Threshold prices are also established for cereals such as grain sorghum that move in international trade but are not normally produced in the Community. The threshold prices are set at levels to prevent these imported grains from undercutting competing domestic grains in the Community market. A standardized c.i.f. price for each grain is calculated for Rotterdam on the basis of the most favorable purchase opportunities on the world market adjusted for quality differences relative to the standard quality for which the threshold prices are applicable. The standardized c.i.f. prices are calculated daily if changes in offer prices warrant it. Thus, levies may vary daily, and hence the term variable levy. The levy equal to the threshold price minus the c.i.f. price of each grain is applied to all imports of that grain without regard to quality, actual offer price, port of entry, or final destination. In addition, threshold and c.i.f. prices are calculated for bread grain flours, and levies are directly determined from them. For other

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44/ Taken largely from (32).

grain products, levies are based on the levies or duties applicable to imports of the base grains (or their components) plus a margin of protection for the domestic processing industry.

Even with protection from imports, prices received by farmers might fall below a minimum level consistent with the target price. To prevent this, intervention prices are established at the wholesale level. For each grain there is a basic intervention price, applicable in Duisburg, and regionally differentiated intervention prices valid in other Community marketing centers. The latter are set at levels that reflect the geographic price spreads to be expected with normal crops, considering the natural conditions of market price formation. The regional prices cannot exceed the basic intervention price. Intervention agencies purchase grain at the intervention price valid at each designated trading center subject to certain minimum conditions regarding quality and quantity.

Other activities of the intervention agencies include:

(1) Granting denaturing premiums for wheat to encourage its use for feed.

(2) Granting transitional compensation to holders of yearend stocks of soft wheat, durum, barley, rye, and corn harvested in the Community not to exceed the difference between the target price for the last month of the old year and the target price for the first month of the new year.

(3) Granting a subsidy to durum wheat producers which is equal to the difference between the guaranteed minimum price and the basic intervention price.

Intervention agencies may sell grain acquired through support operations either for export to third countries or on the domestic markets. Procedures governing disposal are established by the Council. The agencies may sell wheat and rye, suitable for making bread, for use as feed at reduced prices after these grains have been made unfit for human consumption through denaturing.

Annually determined target, threshold, and intervention price levels are valid at the beginning of the marketing year. The prices are increased at monthly intervals during the marketing season to encourage uniform marketing throughout the year.

Without special assistance, exports of grains and grain products would not be possible with domestic prices above world prices. Such assistance is provided in the form of export subsidies equal to the difference between world prices and EC prices. The subsidies are uniform for the whole Community, but are differentiated according to country of destination. Thus, there is provision for setting them high enough to make EC grain competitive in any market in the world.

Licenses are required for all imports and exports of grains and grain products. They are valid for a specific period. A deposit of a surety is required from the importer or exporter to ensure the fulfillment of the obligation to carry out the transaction during the period of validity of the license. The surety is fully or partially forfeited if the importation or exportation does not take place within this period. The import levy or export subsidy may be set at the time the licenses are issued rather than wait for the determination when the transaction actually occurs.

The licenses are to be freely granted upon request. This is in accord with the stated principle that the levies and export subsidies are the exclusive regulators of trade with nonmember countries. Quantitative restrictions, for example, are prohibited. However, there are provisions authorizing the Council to take "appropriate" temporary measures relative to trade with third countries if, because of abnormal imports or exports, the Community market is seriously disturbed or is threatened with serious

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disturbances.

Since the beginning of the 1967/68 marketing year, grain trade between member countries has been free of levies with the exception of trade in the principal feed grains between Italy and the other five member states. At the time of the common grain price decision, Italy was authorized to collect a reduced levy on imports by sea of barley, oats, corn, and sorghum until the end of the 1971/72 marketing year. To maintain the advantage for Community suppliers, Italy must pay a subsidy equal to the levy reduction on imports from other member states. A charge of an equal amount is collected on exports to Italy's partners to prevent diversion of the lower priced imports to other areas of the Community.

Barriers to Imports.--Community grain producers are protected from outside competition by the variable levy system. Levies are assessed on all imports from nonmember countries to bring their prices up to the threshold price. Other protective measures, such as quantitative restrictions, are prohibited although the Council retains authority to make exceptions.

The levy is uniform for each grain throughout the Community except for the temporary reduction on coarse grain imports into Italy. To maintain the levy-paid prices at the threshold price level, the levy can be adjusted daily to compensate for changes in offer prices. Unlike a fixed duty which maintains a constant absolute or percentage margin of protection, the variable levy insulates the internal price from changes in offer prices and prevents producers in nonmember countries from competing with Community production on a price basis.

This insulation is one aspect of the protection accorded to Community producers by the variable levy system. A more apparent and measurable aspect of the protectiveness of the system as it is applied is the amount by which Community prices exceed those at which grains can be purchased on the world market. The average levies during the 1967/68 marketing year were approximately 90 percent of offer prices for wheat and over 60 percent for feed grains. These are large margins of protection when compared with import charges on most products that are important in international trade.

European Free Trade Association

The European Free Trade Association was formalized in May 1960 45/ following the signing of the Stockholm Convention in January of that year. The purpose of EFTA is to eliminate barriers to industrial trade and to encourage trade in agricultural and fishery products. On December 31, 1966, 3 years ahead of the date set in the original timetable, tariffs on manufactured goods were eliminated by the seven member countries. In addition, Finland's tariffs on imports of manufactured goods for EFTA were eliminated at the end of 1967.

Agricultural products are exempt from most EFTA provisions applied to manufactured products. The Convention requires each member of EFTA to protect agricultural exporters in EFTA from "dumped" or subsidized agricultural imports from non-EFTA sources. Similarly, it establishes guidelines for eliminating members' agricultural export subsidies when these are injurious to other members. The Convention also requires that tariff concessions granted in bilateral agricultural agreements between EFTA countries be extended to all members. It promises reciprocity in the form of agricultural trade concessions to members whose economies depend to a great extent on agricultural exports in return for liberalization of trade in manufactured products to members whose economies

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45/ Finland became an associate member of EFTA on June 26, 1961.

depend on those products. Finally, the Convention requires that agricultural policies of members take into account the interest of EFTA's agricultural exporting countries and traditional channels of trade, and requires that the Council, EFTA's decision-making body, annually review the development of agricultural trade within EFTA.

EFTA has liberalized agricultural trade among its members to some extent by two principal means: (1) treating some agricultural commodities as manufactured goods, and (2) encouraging bilateral agreements between members. Council decisions have removed a small number of agricultural products--of minor importance in trade--from the exempted agricultural list. Liberalization of agricultural trade through bilateral agreements has also been limited to a few minor products, although there are exceptions.

Nontariff provisions of the bilateral agreements do not have to be extended to the other EFTA countries. Many of the agreements raise import quotas for certain goods, commit one government to deal with another country's exporters, and provide other benefits. They generally provide for a joint committee of representatives of the two governments to study and discuss common agricultural interests.

Study without thought is vain; thought without
study is perilous. --Confucius (Kung Fu-Tse)

Projection Models

Four basic projections sets are presented in this study. The first basic set is an unbalanced world trade, constant 1964-66 price projection. Income and population growth as well as changes in tastes and technology were taken into account, but no real attempt was made to equate imports and exports. The framework for this projection is discussed below under "Unbalanced World Trade Projections."

The other three basic sets of projections were made with the "World Grain Model" developed by Rojko and Urban as part of overall study of demand prospects for agricultural products of the LDC's (93). These sets provide for relatively buoyant world trade prices under three production levels for less developed countries as well as for two subsets where the United States, Canada, and Australia maintain constant shares of total wheat exports.

Additional production projections were made using past trends in production, area, and yields with extensions to 1980 (see app. E). Also, other price relationships, present and expected technology, changes in tastes, and changes in government policies were considered in an effort to evaluate the feasibility of the projected levels for each region.

Unbalanced World Trade Projections

Basic Assumptions.--The following assumptions underlie the projections to 1980:

1. There will be a continuation of current programs affecting agriculture and trade in foreign countries.

2. There will be no substantial change in price relationships from the 1964-66 base, except where noted.

3. Liberal food assistance programs by developed countries will continue.

4. The adaptation of new production technology for wheat in the LDC's will continue.

Coefficients and growth rates used are given in tables 23, 26, and 27.

Demand.--A 3-year average (for 1964-66) was used for the base period, which was implicitly assumed to represent an equilibrium point in time. At first, relative prices were held constant at this equilibrium level. Only population, income growth, and trend were permitted to influence demand in the following equation for each of the 22 regions.

The basic equation used was:

$$Q_t = Q_o \ (1 + e \ r_1 + r_2 + r_3)^t$$

Where:

Q_t = projected quantity in year t.

Q_o = quantity in base period (1964-66).

e = income elasticity of demand.

r_1 = annual per capita income growth rate in percent.

r_2 = annual trend value in percent, after deductions for the impacts caused by income, population growth, and price changes.

r_3 = annual population growth rate in percent.

t = number of years; t=15 in 1980.

Some modifications to these projections were later made by permitting some adjustments in own price and/or substitute grain prices in selected regions to account for new supply and demand conditions not present in the historical period.

After production was projected, the resulting differences between it and availability were computed and evaluated. Some adjustments were made in the final demand and are discussed below.

Production.--Averages for 1964-66 were also used as the general base reference point for production. When the base average was considered abnormal because of weather or other exogenous factors, it was replaced by an average from a trend line.

The basic model for each region was:

$$S_t = a + b\,T$$

Where:

S_t = the quantity of wheat produced in year T.

a = the constant term.

b = the change associated with trend after deduction for changes due to price effects.

T = number of years; T=15 in 1980.

This model holds relative prices constant at the 1964-66 level. In a few regions, the results appeared unreasonable and the constant price assumption was relaxed. The b value was based on the historical period using own and cross supply price elasticities and actual or estimated price changes to deduct the price impact. In addition, in regions where yields or area are expected to increase more rapidly in the future, some adjustments were made, giving a higher b value.

Special attention was given to the major exporters (United States, Canada, Australia, Argentina, and EC) and the major importers (Japan, EC, United Kingdom, India, Pakistan, and Brazil). The effects of alternative domestic policies on production were considered.

Trade.--Projected trade represents the difference between adjusted production and adjusted demand. Estimates of import costs were made for the projected trade levels.

When these costs seemed excessive, regional production and demand projections were re-evaluated. In some cases, adjustments were feasible to bring trade projections into a "more likely" balance.

World Grain Model

The wheat portion of the World Grain Model is incorporated into this study. A summary of the model is presented below and projections are presented in chapter VII. More detail on the model can be found in the overall grains report (93).

The model was synthesized to be consistent with economic theory and statistical findings to the extent possible. Because of its size, it is not a product of a direct statistical fit. Data for 1964-66 were used to determine the value of the constants in the equations.

The formal econometric World Grain Model was developed to evaluate potential demand prospects and export earnings or import costs of selected agricultural products in the LDC's. The grain model covers wheat, rice, and coarse grain for the 22 regions. It provides a set of internally and externally consistent projections under well-defined assumptions.

The econometric model was designed:

1. To determine equilibrium quantities and prices in some future period by commodities and countries or world regions for a given level of exogenous factors, such as population, income, changing tastes, technology, and other identifiable factors.

2. To determine between countries and regions trade flows that are consistent with national trade policies and the objective function of minimizing transfer costs; and

3. To have a sufficient flexibility to incorporate constraints to reflect institutional limitations.

The model consists of a set of supply and demand equations for each commodity in each country or region and sets of price relationships to link commodities within regions and between regions; an objective function representing a matrix of transfer costs; and a set of constraining relations. Prices were used to relate the behavior of each supply and demand equation within and between regions. Although prices play an important role in the model, other variables and relations are used to account for institutional factors. The output is equilibrium quantities, regional prices of the commodities, and regional trade flows.

Production Equations.--The model includes 64 production equations; it has no equations for rice in Canada and the United Kingdom. The basic production equations for each grain may have up to three price variables affecting production. The equations also include a trend variable to allow for longrun shifts in production functions, net of price changes, but reflecting basic changes in technology. Additional variables in the production equations are discussed under special country or regional situations.

Since it is difficult to compare and evaluate parameters in linear form, the basic response coefficients were converted into direct and cross price elasticities to facilitate comparisons among commodities and regions. These elasticities as well as the growth rates in production, net of price change, are shown in tables 24 and 25. The elasticity coefficients are evaluated at the mean values of the variables for 1964-66.

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Even though area and yield were not estimated separately in the formal mathe-
matical model, an attempt was made to assure consistent relationships among the direct
and cross price effects that took into account yield and area changes. For example,
for any change in price (own or competitive grain price), it was assumed that one part
of the change in production was comprised of a net gain or loss in production due to
substitution of area of one grain for the area of the competing grain. It was assumed
that the other part of the change in production came from an increase in yield or from
new acreage brought into total grain production.

The same basic price response coefficients, except where noted, were used in all
alternatives. However, the trend variable differed for the alternatives in the LDC's
depending on the assumption made with respect to growth in technology. These trend
values are shown in table 25 for the different alternatives.

Demand Equations.--The basic demand equation formulated for the projection model
relates consumption to own price, competing prices, income, population, and a trend
variable. The demand equations used in the model are shown in (93). The elasticities
are evaluated at the mean values of the variables for 1964-66. In addition to the
elasticities, the growth rate in consumption, net of price changes, is shown.

The study assumes that the demand structure does not change basically under the
alternatives. Hence, a single set of parameters is used to generate prices and quan-
tities under the different assumptions. However, the actual levels of consumption in
the LDC's would differ under each alternative projection. This happens because dif-
ferent income levels are assumed for each alternative.

Except where noted, the demand for wheat includes all uses (in wheat equivalent)
at the wholesale level. Lack of adequate information precludes relating wheat use to
end uses such as bread or pastry products.

In the United States, Canada, and the EC, an additional demand function for wheat
for feed use was created. The demand equations for feed wheat become effective in the
model in response to the fall of world wheat prices or to the accumulation of stocks.
The normal use of wheat as feed remains as part of the demand for total wheat when
prices are normal or higher. Thus, a reduced export price of wheat in exporting coun-
tries followed by an increase in stocks of wheat with no change in feed grain prices
tends to increase the feed demand for wheat. This, in turn, reduces the export avail-
ability of wheat. Because an increase in feed use of wheat causes wheat to compete
with other grains used for feed, feed grain prices are affected and export availability
of coarse grains could increase assuming other factors are constant.

In the developed countries, demand for feed grains is related directly to prices
of grain and to income. The influence of the livestock sector was taken into account
in developing the price and income coefficients in the demand equation for feed grains.

Information on cross elasticities of demand is very limited. Even though attempts
at empirical measurement have been largely negative, this study assumes that for certain
regions substitution in demand does exist. In developing estimates of the price co-
efficients in the demand equations, allowance was made for consistency in substitution
among the competing products. For example, a one-for-one relationship might be assumed
between corn and wheat if corn is being used directly for food. On the other hand, if
consumption of wheat is being substituted by consumption of meat and livestock products
supported by corn, the ratio would be considerably higher depending on the livestock
mix and source of feed for the livestock.

Price Equations.--The price equations in the model are the links among the pro-
duction, demand, and stock equations. They also determine the degree of sensitivity
between movements in two different prices.

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The degree of sensitivity is controlled by the coefficient relating the two prices. The coefficient may take on values of zero to one. A value of zero means there is no relationship between prices at two levels, and a coefficient of one assumes a one-for-one relationship. For example, a value of 0.3 (trade price sensitivity) in the wholesale/import price relationship for wheat was used in the EC. This assumes that in the longer run, for every dollar change in the world import price, the internal wholesale price for wheat in the EC will change by 30 cents. When the sensitivity coefficient is equal to 1.0, the constant price in the equations becomes the margin between the two prices. Similarly, the demand sensitivity coefficient relates the consumer level to the wholesale price level.

Transportation Matrix.--The function of the transportation matrix is to assign proper trade flows of grains among the 22 study regions, subject to transportation costs (ocean freight rates) among the regions and to policy constraints included in the model.

Although in its original form the model reflected a classical transportation problem, it was hardly consistent with reality since world trade is not organized solely to minimize total shipping costs. Hence, to obtain a more realistic trade flow, the model was constrained for policy and institutional considerations.

Alternative Projections With the World Grain Model

Using the World Grain Model, three basic projection sets were made. The three basic sets or alternatives assume that all regions continue their current policies and that the United States, Canada, and Australia adjust their supplies according to world conditions. In effect, these countries attempt to maintain buoyant prices given world supply and demand conditions. A more detailed discussion of these policies is given below. The basic sets differ in that the production functions for the LDC's are shifted to the right of the function in one set and to the left in another set. Thus, for a given price, production in the LDC's would be higher or lower than production in set I.

Two of the basic sets have projection subsets. The two subsets are alternatives for the current and higher production function sets. The functions are the same as those under the basic sets, but here the major exporters attempt to maintain their current share of the export market. In these subsets, prices no longer remain buoyant but decline.

In outline form, the alternative projections (sets and subsets) are as follows:

> I: Buoyant prices--Continuing trends. This set includes the effects of the "Green Revolution."

> IA: Market share--Continuing trends. This subset has the same production function as I but the major exporters keep their share of the export market.

> II: Buoyant prices--Higher production functions in the LDC's than under I.

> IIA: Market share--Higher production functions in the LDC's than under I but the same as in II.

> III: Buoyant prices--Lower production functions in the LDC's than under I.

Alternatives I, II, and III assume policies by the United States, Canada, and Australia designed to keep world trade prices of wheat at relatively stable and buoyant levels under alternative production levels in the LDC's. Subsets IA and IIA assume policies where the three major exporters take whatever action necessary under two alternative production levels by the LDC's to maintain a constant share of the export market (38 percent for the United States, 25 percent for Canada, and 15 percent for Australia).

The sets and subsets are based on two important considerations in the export policies of the three major exporters. The first is to maintain world prices at reasor able levels. The second is to maintain a traditional share of the export market. It is not always possible to achieve both of these objectives at the same time. During periods of heavy world supplies, prices cannot be maintained unless importers as well as exporters collaborate equally to curtail production.

The special considerations for the major exporters for the EC and for South Asia under the three basic sets are presented below. The presentation deals specifically with the first set or alternative I. Essentially the same policies apply to alternatives II and III, but the numbers are different. The same general policies also apply to all regions in subsets IA and IIA, but under the market share assumption for the three major exporters.

Basic Projection Set I. Under this alternative, emphasis is on maintaining world price stability, but it is assumed that variation in prices will result when world supplies are in relatively short supply or in heavy surplus. It is further assumed that the United States, Canada, and Australia will promote a storage and production policy to maintain relatively stable and buoyant prices. The implementation of this policy is discussed below for each of the exporters. All other regions are assumed to continue their current policies regarding wheat production, supplies, and trade.

United States.--As the major exporter of wheat, rice, and coarse grain, the United States, through its export policies, exerts a dominant role in world trade. It is assumed that the export policies of the United States are responsive to changes in world demand and supply conditions. The U.S. sector model does not attempt to represent explicitly the U.S. wheat, feed grains, and rice programs. However, the combination of the coefficients in the supply functions, the demand equations for storage, and the demand equations for feed wheat, assume that resonable price stability will be maintained in the export price of wheat and coarse grain. It is assumed export payments or subsidies will be part of the wheat and rice program to permit flexibility in domestic prices and to maintain an export policy of relative world price stability.

Canada.--Canada will continue to maintain domestic wheat policies consistent with the overall policy objectives of the major exporters. In essence, Canada will try to maintain its export price in the upper 60 dollar range for 1 ton of No. 1 Northern at Fort William/Port Arthur. It is assumed if the world export price goes below the desired level, the Canadian Grain Board will adjust its export policies in a way that exports will be reduced when world wheat prices are low and increased when world prices are high. The immediate consequence of this policy, for a given level of production, would be to add to storage when export prices are falling and to withdrawals from storage when prices are relatively high.

It is further assumed the bulk of the wheat will be stored by farmers. Thus, an increase in storage stocks will have the effect of increasing the cost of producing wheat. Consequently, an increase in the level of wheat stocks owned by farmers will tend to reduce wheat acreage, and a decrease in stock levels will tend to encourage expansion of production. The model incorporates the influence of stock levels on production by specifically introducing the stock variable into the production function.

It also has a separate variable for the demand for storage in Canada which relates the change in stock level during any year to production levels and export price levels. 46/

It is assumed as long as the capacity to produce wheat exceeds consumption at "reasonable" prices to producers, there will continue to be a high level of stocks. Further, the level of stocks is estimated to increase over time--7 million tons above the 1964-66 level of 15 million. That is, the model assumes that there will be, on the average, an accumulation of roughly 500,000 tons per year. The assumed stock level of 22 million tons in 1980 is approximately the same level of stocks on July 1, 1969.

It is further assumed the continued excess of capacity in production over world needs will cause some slippage in achieving Canadian policy objectives of a production-consumption balance at roughly the base period price levels. It is estimated that at prices comparable to the base period a rate of accumulation of 2 million tons annually in stocks would occur which must either be fed or set aside for abnormal aberrations from longrun equilibrium. Specifically, the model assumes there is a tendency for stocks to accumulate. Explosive situations are avoided because of unexpected market demands which occur from time to time--for example, the imports by the USSR in the mid-1960's and the imports due to the India drought.

The model also has a special demand equation for feed wheat when stocks of wheat begin to accumulate. This demand for wheat becomes a source of supply in the coarse grain sector in Canada. Thus, an increase in storage stocks of wheat increases feed use, which reduces export availability of wheat but increases export availability for coarse grains in Canada.

Australia.--It is assumed grain production policies in Australia will also be sensitive to world prices and be consistent with maintaining relative world price stability. As in the case of Canada, wheat production is assumed to be influenced by stock levels; thus, the stocks variable is included in the supply function. In turn, the demand for stocks is related to wheat production and the wholesale price of wheat. Since the wholesale price of wheat is related to the export price, the level of stocks is affected by the world demand situation.

Argentina.--It is assumed Argentina will not adopt a stocks policy. Thus, no special equation for demand for stocks was developed. It is further assumed grain production is sensitive to world prices.

EC.--It is assumed the EC will attempt to continue its Common Agricultural Policy of high internal prices, import restrictions, and subsidies to export surpluses. Effective harmonization of producer prices for grain will be completed within the EC. It is assumed a considerable amount of wheat will continue to be used as feed. The amount of feed wheat used will be affected by the quality of domestic wheat as well as by world trade prices, internal wheat and feed grain prices. Specifically, a kinked demand is assumed for wheat. At normal price relationships between EC and world levels, the quantity of wheat fed is part of the interaction between the demand equations for wheat and feed grains. However, when world prices fall substantially, the subsidy cost of exporting wheat rises considerably. Therefore, at some point, it becomes more efficient to shift wheat to feed uses rather than to export it. To account for this, the World Grain Model has specific equations to relate the export price of wheat to wheat feed use. Therefore, lowering of world wheat prices relative to feed grain prices leads to increased use of wheat for feed and reduced feed grain imports to the EC.

46/ See p. 15 for an analysis showing the influence of stocks on production.

Special assumptions regarding South Asia.--In most regions, the demand functions have the usual price, income, population, and trend factors. However, in South Asia these factors are not sufficient to explain variations in demand under alternative projections when production of a single grain varied considerably. These variations result because the amount of wheat, rice, or coarse grain consumed is a function of availability of each grain as well as of price. For example, the relative amount of wheat or rice consumed in the 1980's in India will depend on the relative improvements in production technology of the two grains. If technology is more favorable to wheat than to rice, consumption of wheat will rise considerably faster than rice consumption.

It is assumed the total substitution effect between wheat and rice cannot be fully expressed through prices alone. A further assumption is that any shortfall between production and consumption of grains will primarily be made up from imports of wheat. Thus, production of rice as well as production of wheat will affect the consumption and trade of wheat. The production variables of wheat, rice, and coarse grain were added as additional variables to the demand equations for wheat, rice, and coarse grain to account for the substitution effects directly. These additions to the demand equations assume that the consumption of rice is affected by the production of wheat. Thus, shortfalls in the production of all grains are made up from imports of wheat. However, since consumption also varies with production, only some of the shortfall is compensated by imports of wheat. For example, a 10-million-ton shortfall in production of rice results in 6.5 million tons of wheat imports.

It was assumed that consumption of coarse grain would not be affected directly by the production of wheat and rice. However, substitution between rice, wheat, and coarse grain would continue by the inclusion of the prices for wheat, rice and coarse grain in each of the demand functions for wheat, rice and coarse grain. The substitution effect represented by prices may be considered to represent the normal substitutions in consumption, while the additional effect of substitution introduced by the production variables represent substantial shifts due to technological change.

Population Projections

Population is the key variant in growth in demand. Thus, assumptions regarding population growth are critical in analysis of demand prospects for agricultural exports. Original research on population growth, however, was not within the intent of this study. A number of world demographic studies have been conducted. Consequently, population growth rates used for analytical purposes and projections were based, with some modifications, on the population projections of the Population Division of the United Nations. This Division has been preparing projections for the world and selected regions for over 15 years. Its most recent study on the world population was published in 1966 (99). The projections contained in the 1966 report have been widely used throughout the world. However, some adjustments to the UN projections were made for the present study, based on recent studies by the Food and Agriculture Organization (FAO) of the United Nations and the Organization for Economic Cooperation and Development (OECD), and the USDA's long-term supply and demand studies.

For this study, a single population projection was selected for each country. The regional population projections which were used are presented in table 26. Considerably higher growth rates are used for the LDC's than for the rest of the world. It was not deemed necessary to develop high and low population projections, although major changes in growth rates will affect the projections.

Income Projections

Another key demand variant is income growth. With given levels of population, prices, and other factors, the rate of increase in income largely determines the pattern and level of per capita consumption. Population may be the most important demand factor in the LDC's, but income may be more important in countries with low population growth rates--for example, Japan, where population growth is less than 1 percent and income growth over 8 percent.

Table 27 presents the projected rates of growth in national income selected for use in this study and table 28 shows the levels in dollar terms. 47/ Original research on the economic growth prospects of the countries of the world was not within the scope of this study. The projected growth rates were therefore obtained through a careful review of studies in this area. Besides the trends in the historical time series data on national accounts, the main sources guiding the selection of final growth rates were a 1967 FAO report entitled Agricultural Commodities-Projections for 1975 and 1985 (43), a 1968 OECD report entitled Agricultural Projections (81), and the USDA series of supply and demand studies on foreign countries.

The rate of income growth in the LDC's is as high or higher than that for the developed regions. However, the high rate of population growth reduces the per capita levels and per capita growth rate.

The same income projections were used for the unbalanced world trade projection set and under alternatives I and IA. However, for the LDC's separate income projections were generated for alternative sets II and III. It was assumed that changes in income growth were associated with changes in grain production in the LDC's. 48/ Therefore, the rates of income growth for the LDC's were adjusted with the shifting production functions--up for set II and down for set III. In effect, the traditional demand curves were shifted slightly under these alternatives.

47/ Detailed country and regional projections are contained in a working paper prepared for this study (75).

48/ It was also assumed that productivity in the rest of the agricultural sector would experience levels similar to the productivity of grains.

Table 23.--Coefficients for "unbalanced world" wheat trade projections

Region	Demand			Supply
	Income elasticity (e)	Income growth rate (r_1) 1/	Demand growth rate (trend) (r_2) 1/	Trend (b)
	- - - - - - - - - Percent - - - - - - - - -			1,000 m.t.
United States. . . .	-0.3	3.0	0.3	865
Canada	-0.1	2.3	-2.6	294
Argentina.	-0.3	1.4	0	116
Australia & N. Zealand	-0.2	2.3	-1.1	374
Japan.	0.1	7.2	0	25
EC	0	3.5	0.2	500
United Kingdom . . .	-0.2	1.9	0	40
Other Western Europe	-0.3	3.4	0	170
South Africa, Rep. of	0	1.8	0.2	15
USSR	0	4.3	-0.1	1,415
East Europe.	0	4.1	0.9	600
Communist Asia . . .	0.1	2.2	-0.5	604
Cent. Amer. & Carib.	0.3	2.8	0.8	87
Other East S. Amer.	0.2	2.1	0	23
West S. America. . .	0.3	1.9	0.9	19
North Africa	0.3	1.5	0.7	205
West Africa.	0.7	1.3	2.1	1
East Africa.	0.6	1.9	0.8	20
West Asia.	0.2	2.4	0	445
South Asia	0.4	1.6	1.0	1,745
Southease Asia . . .	0.3	1.5	3.4	2
East Asia & Pacific.	0.3	1.6	1.1	8

1/ Compound annual rate.

Table 24.--Price, income, and sensitivity coefficients, and net trend values used for the 1980 world grain model projections 1/

	Supply				Demand					Sensitivity coefficients		
Region	Price elasticities			Net trend per year 3/	Price elasticities			Income elasticity	Net trend per year 3/	Supply	Demand	Trade
	Wheat	Rice 2/	Coarse grains 2/		Wheat	Rice 2/	Coarse grains 2/					
				Percent					Percent	Percent		
Major exporters:												
United States. . . .	0.2	0	-0.15	1.1	-0.2	0	0.1	-0.3	0	0.6	1.0	0.4
Canada	0.4	0	-0.07	0.7	-0.2	0	0.15	-0.1	-3.7	1.0	1.0	0.8
Argentina.	0.3	0	-0.13	2.0	-0.3	0	0.05	-0.3	0.3	1.0	0.7	0.8
Australia & N. Zealand :	0.4	0	0	0.4	-0.2	0	0	-0.2	-1.4	1.0	1.0	0.8
Developed importers:												
Japan.	0.4	-0.27	-0.1	-2.3	-0.33	0.75	0	0.1	1.5	0.3	1.0	0.9
EC	0.3	0	-0.12	1.6	-0.3	0	0.2	0.2	0.2	1.0	1.0	0.3
United Kingdom . . .	0.4	0	-0.22	1.6	-0.2	0	0.1	-0.2	0.2	0.3	1.0	1.0
Other Western Europe .	0.3	0	-0.19	0.7	-0.3	0	0.1	-0.3	0.2	0.5	1.0	0.5
South Africa, Rep. of :	0.25	0	-0.1	2.7	-0.3	0	0.1	0	0.5	0.7	1.0	0.5
Central plan countries:												
USSR	0.2	0	-0.01	2.1	-0.2	0	0.2	0	0.1	0.3	0.5	0.1
Eastern Europe . . .	0.2	0	-0.11	2.4	-0.2	0	0.08	0.1	0	0.3	0.6	0.1
Communist Asia . . .	0.2	0	0	3.6	-0.1	0	0	0	0.6	0.3	0.3	0.1
Less developed:												
Cent. Amer. & Carib.	0.3	-0.06	-0.2	3.9	-0.4	0.15	0.2	0.4	0.9	0.9	0.8	0.6
East South America .	0.2	-0.08	-0.05	2.1	-0.2	0.1	0.1	0.2	0	0.4	0.7	0.3
West South America .	0.2	-0.3	0	1.4	-0.2	0.1	0.15	0.3	1.7	0.5	0.7	0.3
North Africa	0.3	0	-0.01	0.9	-0.2	0.02	0.05	0.3	1.3	0.5	0.7	0.3
West Africa.	0.1	0	0	2.8	-0.5	0.32	0.34	0.7	4.1	0.5	0.7	0.2
East Africa.	0.1	0	0	2.9	-0.4	0.14	0.31	0.6	1.7	0.5	1.0	0.3
West Asia.	0.1	0	-0.03	2.0	-0.2	0.01	0.04	0.2	0	0.7	0.8	0.5
South Asia	0.2	-0.16	-0.08	5.4	-0.5	0.16	0.02	0.4	0.9	0.5	0.8	0.4
Southeast Asia . . .	0.1	0	0	4.6	-0.04	0.25	0	0.3	3.4	0.5	1.0	0.6
East Asia & Pacific..	0.2	0	0	2.1	-0.5	0.37	0.22	0.4	1.7	0.3	1.0	0.8

1/ Coefficients and trend values used for all regions under alternatives I and IA, and for all but Argentina and the less developed regions in alternatives II, IIA, and III. In the case of alternative III, the price demand elasticities were raised by about 0.1 for all less developed regions except South Asia, West Asia and North Africa, where wheat consumption is relatively high. This adjustment is to offset the decrease in elasticities that results with lower prices and linear demand functions. Also for alternative III, the demand or trade sensitivity coefficients were raised for the same less developed regions to indicate more response to price changes at lower world prices.

2/ Cross price elasticities.

3/ Actual data used were in metric tons: the figures shown here are in compound percentage terms only to present the relative magnitudes of the change. The percentages were computed from an adjusted trend line base figure for 1965. Significant differences in adjusted base versus the actual 1964-66 average occurred only for production in Canada and Argentina, where the base was adjusted downward, and for production in the USSR and South Asia, where the base was adjusted up.

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Table 25.--Alternative growth rates for income and the wheat production trend value under alternative projections for the LDC's 1/

Region	Income 1965 to 1980			Wheat production trend, 1965 to 1980		
	Set I & IA	Set II & IIA	Set III	Set I & IA	Set II & IIA	Set III
	- - - - - - - - Percent per year 3/ - - - - - - - -					
Argentina.	3.3	4.6	2.4	2.0	2.3	1.4
Cent. Amer. & Carib.	5.8	8.1	4.1	3.9	5.5	2.8
East South America . .	5.0	7.0	3.6	2.1	2.9	1.5
West South America . .	4.8	6.7	3.4	1.4	2.0	1.0
North Africa	4.9	6.9	3.5	0.9	1.3	0.6
West Africa.	4.2	5.9	3.0	2.8	3.9	2.0
East Africa.	4.1	5.7	2.9	2.9	4.1	2.1
West Asia.	5.3	7.4	3.8	2.0	2.8	1.4
South Asia	4.2	5.9	3.0	5.4	7.6	3.9
Southeast Asia	4.4	6.2	3.1	4.6	6.4	3.3
East Asia & Pacific. .	4.5	6.3	3.2	2.1	2.9	1.5

1/ More detail is given in tables 27 and 28. There was no change in the rates used for the developed and the central plan regions.

2/ These rates were also used for the unbalanced world trade, constant price projections.

3/ These percentages are compound annual rates and are computed from the trend values given in dollars and in 1,000 metric tons which entered the world grain model in linear form.

Table 26.--World population by regions, 1965 and projected 1970, 1975, and 1980

Region	Population				Population growth rate per year			
	1965	1970	1975	1980	1965-70	1970-75	1975-80	1965-80
	Thousands				Percent			
United States	194,572	207,725	223,180	241,079	1.3	1.4	1.6	1.4
Canada	19,604	21,451	23,581	26,024	1.8	1.9	2.0	1.9
Argentina & Falkland Is.	22,354	24,256	26,257	28,381	1.6	1.6	1.6	1.6
Australia & New Zealand	14,000	15,227	16,554	18,216	1.7	1.7	1.9	1.8
Major exporters. . .	250,530	268,659	289,572	313,700	1.4	1.5	1.6	1.5
Japan.	97,960	101,918	106,647	111,563	0.8	0.9	0.9	0.8
EC	181,594	187,591	193,182	198,385	0.6	0.6	0.6	0.6
United Kingdom	54,595	56,610	58,655	60,690	0.7	0.7	0.7	0.7
Other Western Europe . .	87,684	90,809	94,003	97,489	0.7	0.7	0.7	0.7
South Africa, Rep. of. .	17,867	20,554	23,292	26,676	2.9	2.5	2.8	2.7
Developed importers.	439,700	457,482	475,779	494,803	0.8	0.8	0.8	0.8
USSR	230,600	245,266	260,350	277,325	1.3	1.2	1.3	1.3
Eastern Europe	121,430	127,179	133,083	138,763	0.9	0.9	0.8	0.9
Communist Asia	795,604	878,983	971,117	1,077,064	2.0	2.0	2.1	2.0
Central plan countries :	1,147,634	1,251,428	1,364,550	1,493,152	1.8	1.8	1.8	1.8
Central America & Caribbean:	80,078	93,402	109,323	128,508	3.1	3.2	3.3	3.2
East South America . .	96,052	110,737	127,604	146,544	2.9	2.9	2.8	2.9
West South America . .	47,640	54,555	62,710	72,260	2.8	2.8	2.9	2.8
North Africa	74,606	86,016	99,580	115,284	2.8	3.0	3.0	2.9
West Africa.	132,564	149,546	170,021	194,463	2.4	2.6	2.7	2.6
East Africa.	84,890	94,648	107,085	121,157	2.2	2.5	2.5	2.4
West Asia.	87,877	99,597	114,203	131,372	2.5	2.8	2.9	2.7
South Asia	638,064	722,172	815,439	913,655	2.5	2.5	2.3	2.4
Southeast Asia	81,057	92,157	104,267	117,969	2.6	2.5	2.5	2.5
East Asia & Pacific. .	198,597	226,333	258,508	298,920	2.7	2.7	2.9	2.8
Less developed . . .	1,521,425	1,729,163	1,968,740	2,240,132	2.6	2.6	2.6	2.6
Total world.	3,359,289	3,706,732	4,098,641	4,541,787	2.0	2.0	2.1	2.0

Source: (75).

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Table 27.—Growth rate of projected income, by regions, 1965-80 1/

Region	Income growth rate per year				Per capita growth rate per year			
	1965-70	1970-75	1975-80	1965-80	1965-70	1970-75	1975-80	1965-80
	Percent							
Major exporters:								
United States.	4.3	4.3	3.8	4.1	3.0	2.9	2.2	2.7
Canada	4.3	4.3	4.1	4.2	2.5	2.4	2.1	2.3
Argentina.	3.0	3.0	3.9	3.3	1.4	1.4	2.3	1.7
Australia & New Zealand :	4.0	4.0	4.0	4.0	2.3	2.3	2.1	2.2
Developed importers:								
Japan.	8.0	8.0	8.0	8.0	7.2	7.1	7.1	7.2
EC	4.1	4.2	4.5	4.3	3.5	3.6	3.9	3.7
United Kingdom . . .	2.6	2.6	4.1	3.1	1.9	1.9	3.4	2.4
Other Western Europe .	4.1	4.7	4.3	4.4	3.4	4.0	3.6	3.7
South Africa, Rep. of.	4.5	4.5	4.5	4.5	1.6	2.0	1.7	1.8
Central plan countries:								
USSR	5.6	5.5	5.8	5.7	4.3	4.3	4.5	4.4
Eastern Europe . . .	5.0	5.0	4.9	5.0	4.1	4.1	4.1	4.1
Communist Asia . . .	4.2	4.2	4.2	4.2	2.2	2.2	2.1	2.2
Less developed:								
Central America & Carib.:	5.9	5.6	5.8	5.8	2.8	2.4	2.5	2.5
East South America . .	5.0	5.0	5.0	5.0	2.1	2.1	2.2	2.1
West South America . .	4.7	4.7	5.0	4.8	1.9	1.9	2.1	2.0
North Africa	4.3	4.9	5.5	4.9	1.5	1.9	2.5	2.0
West Africa.	3.8	4.3	4.6	4.2	1.3	1.7	1.9	1.6
East Africa.	3.8	4.1	4.3	4.1	1.6	1.6	1.8	1.7
West Asia.	5.0	5.4	5.6	5.3	2.5	2.6	2.7	2.6
South Asia	4.1	4.1	4.5	4.2	1.6	1.6	2.1	1.8
Southeast Asia . . .	4.2	4.3	4.6	4.4	1.6	1.3	2.1	1.9
East Asia & Pacific. .	4.2	4.3	4.8	4.5	1.5	1.6	1.9	1.7

1/ Rates used in the unbalanced world trade projection set; and for alternatives I and I-A; and for the developed regions and central plan regions in alternatives II, II-A, and III. Basic data is given in table 28.

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Table 28.--Income by regions, total and per capita, 1965 and projected 1970, 1975 and 1980, as used for the unbalanced world trade projections and for alternatives I and IA

Region	Dollars of year	Income				Per capita income			
		Billion dollars				Dollars			
		1965	1970	1975	1980	1965	1970	1975	1980
Major exporters:									
United States 1/	1958	397.8	491.0	606.0	730.3	2,044	2,364	2,716	3,029
Canada 1/	1958	27.1	33.5	41.4	50.6	1,385	1,562	1,754	1,942
Argentina 3/.	1965	16.1	18.6	21.6	26.1	718	767	821	920
Australia & New Zealand 1/	1958	14.3	17.4	21.2	25.9	1,023	1,144	1,281	1,421
Developed importers:									
Japan 1/.	1958	34.9	51.3	75.3	110.7	356	503	706	992
EC 1/	1958	146.4	179.1	220.4	275.0	806	955	1,141	1,386
United Kingdom 1/ . . .	1958	53.9	61.3	69.7	85.2	988	1,083	1,188	1,404
Other Western Europe 1/	1958	48.8	59.8	75.2	92.6	557	658	800	950
South Africa, Rep. of 1/	1958	7.2	8.9	11.1	13.9	401	434	478	520
Central plan countries:									
USSR 2/	1961-63	219.7	288.5	377.1	499.9	953	1,176	1,448	1,802
Eastern Europe 2/ . . .	1961-63	85.3	108.9	138.8	176.6	702	856	1,043	1,273
Communist Asia 2/ . . .	1961-63	85.6	105.2	129.2	158.7	108	120	133	147
Less developed:									
Cent. Amer. & Carib. 3/	1965	30.8	41.0	53.8	71.3	384	439	492	555
East South America 3/.	1965	31.9	40.6	51.7	66.0	332	366	405	450
West South America 3/.	1965	15.4	19.3	24.3	31.0	323	354	387	429
North Africa 3/ . . .	1965	13.1	16.2	20.6	26.8	176	189	207	232
West Africa 3/. . . .	1965	14.4	17.4	21.5	26.9	109	116	126	138
East Africa 3/. . . .	1965	8.3	10.1	12.3	15.2	97	107	115	126
West Asia 3/.	1965	26.7	33.9	44.1	57.9	303	341	386	440
South Asia 3/	1965	64.1	78.3	95.7	119.2	100	108	117	130
Southeast Asia 3/ . . .	1965	8.4	10.4	12.8	16.0	104	112	123	136
East Asia & Pacific 3/.	1956	28.1	34.6	42.8	54.2	141	153	165	181

1/ Consumer expenditures data from (75, table 43). 2/ Net material product data from (75, table 44). 3/ Gross national product data from (75, table 45), (table 46), (table 47), (table 48), (table 49).

> No one knows exactly what the demands for farm pro-
> ducts will be...Nor can anyone foresee the exact
> supplies of agricultural commodities...Yet farmers,
> legislators, and administrators...cannot work entire-
> ly in the dark. They must base their plans upon the
> best possible estimates of future demand and supply
> conditions. --Frederick V. Waugh

The four basic projection sets discussed in the preceding chapter yield results
which can be linked in a number of ways. In choosing a combination for discussion,
focus was given to the trade of the LDC's and how it might be affected given certain
conditions. To trace these effects, two subsets using a "marketing share" assumption
for the major exporters are included as alternatives. The combination described below
is neither direct nor continuous. The connector used here is mainly comparative, moving
from one set or subset to another to test the effects of relevant assumptions.

The Projections and Comparisons

The first set of projections (unbalanced world trade) is founded on the assumption
of constant relative prices. That is, there will be no substantial change in the
supply/demand/trade-price relationships from those of the reference period (1964-66).
Other assumptions basic to this set have been listed in chapter VI.

The remaining three basic sets, which are integral parts of the World Grain
Model, have a common premise that the major exporters will pursue policies to maintain
prices at reasonable levels. This does not imply stable prices but rather an attempt
by exporters to maintain reasonable price levels and price stability under prevailing
world demand conditions. As indicated in the previous chapter, this common premise is
tested for three different levels of supply in the LDC's.

The premise of the two projection subsets is that the major exporters will follow
a policy of market share maintenance. That is, they will take actions necessary to
maintain a "traditional" share of the world market, regardless of the level of the
market. These subsets are used with sets I and II and are identified as IA and IIA.

As shown in chapter VI, the analytical framework for all of the projection sets
was congruous to some degree. For instance, population growth and income growth in the
developed and central plan regions did not change; production technology was unchanged
although the rate of development was varied for the LDC's. Therefore, the sets yielded
some results that are alike. These are listed below. Unless noted otherwise, they
apply to all sets and subsets:

(1) Wheat production in South Asia will increase rapidly, reflecting the success
of the semidwarf varieties and the increased application of inputs.

(2) The USSR will have its supply problem well in hand--stocks will be at desired
levels, and net exports may approximate the levels of the period prior to 1963.

(3) Japan is expected to have a strong demand for wheat and should continue to be
an expanding import market.

(4) There will be a growing import demand in those less developed regions which
experience rapid economic growth. These regions include Central America, East and West
South America, East Asia, Southeast Asia, and West Asia. Much of this demand will be

from a growing commercial market.

(5) Growing imports of most African regions would most likely be food aid shipments.

Unbalanced World Trade

What would the world wheat situation be like in 1980 if prices and policies were not changed and the recent trends of supply and demand in each country were to continue, being impervious to world conditions?

These projections generally reflect a continuation of the current world wheat economy--abundant supplies and slackening growth of import demand (table 29). Even though prices were held constant for these projections, the implied stock buildups would force some production adjustments in major producing nations, and there would be continuing downward pressures on prices. Wheat feeding would be quite important, and from both the demand and production view, wheat would be considered a feed as well as a food grain.

Aggregating regional trade projections to world totals resulted in a large imbalance of about 22 million tons. 49/ This indicates that price or policy adjustments would have to be made when the pressure of the interacting forces becomes evident. Obviously, in a real sense, exports and imports must be reasonably close. This aggregated world surplus is similar to that arrived at in other long-range outlook studies. (3 and 42).

The following developments highlight the change from a balanced base period to a surplus future:

(1) In South Asia, projected production of 43.5 million tons is 150 percent higher than in the base period. Underlying the production projection were the assumptions that the total wheat area in India and Pakistan would not change significantly from recent levels; that two-thirds and three-fifths of the wheat area, respectively, would be sown to semidwarf varieties and irrigated; and yields of the semidwarf varieties would average 2,200 kilos per hectare (33 bushels per acre). With the projected production and disappearance, net imports would total 5.5 million tons. 50/ This is well below the high base period level of 9.3 million tons. It is possible that Pakistan will be self-sufficient in wheat 51/but India is expected to continue to import wheat for the following reasons:

    (a) To supply metropolitan areas distant from its wheat-producing regions. Currently, domestic wheat prices in India are well above world prices, and it appears that, if this relationship holds, the Government of India as a matter of policy might import wheat to minimize consumer subsidies.

    (b) There will probably be a need for imported hard wheat for flour needed for bread, pastas, and pastries.

(2) Projected production in Canada and Australia is up 35 percent but disappearance is down 7 percent. These projections would result in an increase in exports of 12.5 million tons over the base period level.

49/ Net exports were greater than net imports. 50/ Though South Asia's statistics are dominated by India and Pakistan, Ceylon is a relatively large wheat importer. 51/ Some wheat may still be imported for use in East Pakistan.

(3) Projected U.S. production of 48.4 million tons is up 37 percent over the base period level. For the projected period, area was held at the level of the 1969 national wheat allotment of 20.9 million hectares. Much more land could become available if current policies were altered. The 1970 wheat program calls for a reduction to 18.4 million hectares (a 12-percent reduction from 1969). About 29.2 million hectares of wheat were harvested in 1952/53 and 23.8 million hectares were harvested in 1967/68.

(4) If population and income rise as projected, there would be no slackening in the import requirements of the LDC's. At first glance this appears to be a paradoxical situation, considering the "Green Revolution." But in these countries, the population growth rate is high and the demand for wheat is quite responsive to an increase in income. Also, there has been a significant increasing trend in wheat consumption in many of these countries, reflecting change in the patterns of consumption. These factors result in substantial increases in per capita consumption and a total growth rate which would exceed that for production.

In summary, this projection set indicates that world supplies of wheat should continue to be bountiful and that unless major producing countries come to grips with adjustment problems, the supplies will be too bountiful. The trade outlook cast from the projections is not promising from the standpoint of potential export earnings for the LDC's. On the contrary, import costs for wheat in the LDC's would continue to rise as aggregate demand outpaced production. Of course, in a large area of the LDC's, wheat cannot be produced for climatic reasons, and any increase in demand would necessarily be filled by imports.

A Projection Sequence

From the situation just described, the projection course turns to an equilibrium situation where shifts in functions and changes in prices bring about a balance to the world's supply and demand.

A path to follow in tracing the projection sets through a logical sequence begins with the levels of the 1964-66 base period and moves to set I. From there a comparison is made between I and set II to note the effects of accelerated production growth in the LDC's. The sequence is concluded with the introduction of the "Market Share Assumption" (IIA) to show what differences might occur if the major exporters were to implement a policy of market share maintenance. Alternative levels of production, availability, trade, and earnings are given in tables 30 through 33.

Set I/Base Period.--On the production side, the most pronounced change between the base period and set I is the 90-percent increase in wheat output in the LDC's, primarily in South Asia, Central America (Mexico), and West Asia. This increase would be due to the introduction and expanding use of semidwarf varieties as well as to increased application of inputs. Production of the major suppliers increases only 14 percent, reflecting their position of managing supplies to maintain world prices at relatively high levels.

The consumption projections are indicative of relatively high rates of population and income growth in the LDC's, combined with a high positive response to income. Consumption for the LDC's increases 73 percent, with the gains being uniformly high throughout these countries. On the other hand, projections for the developed area reflect a sluggish demand, which is consistent with a generally negative response to income and relatively low rate of population growth. For the major exporters and developed importers, consumption increases only 15 percent; if Japan, whose income response is high, is excluded, the increase for this area is only 13 percent.

Perhaps the most surprising development of set I is the 45-percent increase in net imports for the LDC's. The only less developed region to have a drop is South Asia, whose imports decline 7.0 million tons from the very high level of 9.3 million tons in

the base period. 52/ Net imports of the developed importers are down as Other Western Europe switches from a net importer to a net exporter position, and the EC increases its net exports threefold. Japan, on the other hand, remains a growing market, with imports increasing 80 percent to 6.5 million tons. Trade in the central plan regions also changes markedly, with the Soviet Union shifting from a net importer position back to its traditional net exporter role. The net result of these trade changes as they affect the major exporters are nearly offsetting, although these countries' exports are down slightly from the base period, but significantly higher than in most recent years.

In summary, set I from the view of the less developed countries is not encouraging. Import costs would rise to meet the effective demand despite rapidly expanding production. The export earnings of Argentina do increase significantly, as this country would be expected to ship more wheat to nearby regions.

Set II/Set I.--A question then arises as to how might the trade outlook for the LDC's improve. In set II, annual growth rates in production in the LDC's are stepped up from the set I levels by an annual rate of 1.4 percent. This might be termed an "accelerated green revolution." An obvious effect is that production in the LDC's would be higher than in set I--by about one-fourth. This stepped-up production would provide some income growth and thus increase demand slightly. As a result, consumption in the less developed countries would be about 10 percent higher.

There is a striking change in trade with this set of conditions. Import costs for the LDC's are down sharply from those in set I to near the base period level. The principal reason for this is South Asia, which shifts from a net importing position of 2.4 million tons to a net exporting position of 7.1 million tons. However, demand and imports of the non-wheat-producing regions increase in response to lower world prices. Exports from the major suppliers are down by 7.7 million tons, with the United States and Canada accounting for most of the decline.

The supply/demand situation in set II leads to a drop of about 10 percent in world trade prices. With reduced imports and lower prices, net costs for the LDC's are $1,839 million, 23 percent lower than under the set I situation.

Thus, the wheat trade outlook is decidedly improved for the LDC's under set II conditions. Import costs are down and export earnings are up. The major suppliers take the brunt of these developments with lower exports and prices. To do this they have implemented an adjustment program which has reduced production and increased stocks.

Subset IIA/Set II.--But what might happen if the United States, Canada, and Australia were not willing to pull back from the world market and adjust their supplies accordingly? To accommodate such a comparison, the market share condition for the major exporters was used under the accelerated production set IIA. With this condition, production of the major exporters would be substantially higher. Prices would drop precipitously. These low price levels would bring wheat into a competitive position with feed grains and a sharp rise in use of wheat for feed would result. Therefore, consumption in the major exporting countries and the EC is about 19 percent higher than under II. The net effect of this response is that the EC would shift from a net exporter position to a net import position; and shipments to the developed importers would be 6.0 million tons higher. Exports of the major suppliers are up 11.6 million tons as these countries push to maintain their traditional shares of the world market. The import costs of the LDC's are down substantially, reflecting the lower trade prices.

52/ The reader is reminded that the base period includes the 2 severe drought years which resulted in massive food aid shipments.

On the other hand, export earnings of the LDC's are also down, as Argentina and South Asia not only lose trade but also receive substantially lower prices for their exports.

Subset IA/Set I.--The market sharing condition which concluded the last sequence is also the basis for the next comparison. Should the LDC's only be able to maintain the rate of production growth at past trends, what would occur if the major suppliers were to retain their traditional market share?

The major changes under this subset occur within the major exporters and developed importers. Production of the major exporters moves up from the set I level by nearly 15 percent. The increased supplies depress world prices, and trade prices are down substantially from set I levels. There is some pickup in consumption (mainly for feed) in response to these lower prices in the developed regions. Exports of the major suppliers are 2.4 million tons higher in set IA than in set I. Much of this gain is at the expense of the EC, whose net exports drop. In addition, the import demand in other developed importing regions is higher in response to the lower import prices.

The volume of trade in the LDC's shows little change from that in set I, but with lower prices, import costs are down substantially. Argentina's export earnings suffer since she not only loses trade to the market share condition but also receives substantially lower export prices.

In summary, from the standpoint of trade earnings and costs, it appears that IA may be more advantageous to the LDC importers than to the LDC suppliers as reduced prices more than offset the gains in trade.

Set III/Set I.--What might the situation be if the "Green Revolution" were short-lived and production growth lapsed to lower rates? Another projection course examined assumes that output growth in the LDC's will be less than the rates of set I (continuing trends). To effect this assumption for set III, the annual production growth rates of set I were reduced 1.4 percent for all LDC's including Argentina.

In addition to lower wheat production in the LDC's, a lower rate of income growth is associated with this assumption. Thus, not only output in the LDC's is curbed but also their demand for wheat. Another demand retardant is the substantially higher prices which would result from lower world supplies of wheat. In set III, trade prices are near the high levels of 1964-66. Although consumption in the LDC's drops, the rate of decline is less than the decline in production and the net result is that the volume of net imports would be up sharply from the level of set I. This coupled with higher import prices would cause import costs for the LDC's to soar.

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Table 29.--World wheat production, domestic disappearance, and net imports by regions, average 1964/65-1966/67 and "constant price, unbalanced world" projection, for 1980

Region	1964/65-1966/67 [1]			1980		
	Production	Domestic disappearance	Net imports [2]	Production	Domestic disappearance	Residual [3]
	- - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - -					
United States [4]	35,478	18,637	-21,163	48,450	21,100	-27,350
Canada	18,846	4,159	-13,848	23,260	3,620	-19,640
Argentina.	7,846	3,863	-5,063	9,590	4,720	-4,870
Australia & New Zealand. . . .	10,207	2,720	-6,339	15,820	2,810	-13,010
Major exporters.	72,377	29,379	-46,413	97,120	32,250	-64,870
Japan.	1,185	4,759	3,645	1,560	7,400	5,840
EC	28,759	27,703	-1,288	36,260	31,170	-5,090
United Kingdom	3,813	8,166	4,329	4,410	8,760	4,350
Other Western Europe	10,202	11,501	1,340	12,750	11,090	-1,660
South Africa, Rep. of.	770	1,136	366	1,000	1,770	770
Developed importers. . . .	44,729	53,265	8,392	55,980	60,190	4,210
USSR	63,067	65,475	2,408	84,300	79,800	-4,500
Eastern Europe	20,848	26,563	5,715	29,850	34,660	4,810
Communist Asia	22,933	28,655	5,722	32,000	35,500	4,500
Central plan countries . .	106,848	120,693	13,845	146,150	150,960	4,810
Central America & Caribbean. .	1,894	2,870	976	3,200	5,550	2,350
Other East South America . .	803	3,813	3,010	1,150	6,190	5,040
West South America	1,615	2,836	1,221	1,900	5,350	3,450
North Africa	4,120	7,691	3,571	7,200	14,280	7,080
West Africa.	26	653	627	40	1,520	1,480
East Africa.	484	789	305	780	1,480	700
West Asia	12,475	14,442	1,947	19,600	23,270	3,670
South Asia	17,311	26,654	9,343	43,480	49,000	5,520
Southeast Asia	74	253	179	100	520	420
East Asia & Pacific.	332	2,410	2,078	450	4,580	4,130
Less developed	39,134	62,411	23,257	77,900	111,740	33,840
Total world.	263,088	265,748	-919	377,150	355,140	-22,010

[1] Includes changes in stocks where data are available. [2] Minus indicates net exports. [3] Difference between projected production and domestic disappearance. [4] Production projected using 1969 national acreage allotment of 20.9 million hectares and yields of 2,320 kgs./ha. (34.5 bu./acre). In 1949-51, seeded acreage averaged 31.5 million hectares; in the last 15 years, 27.4 million hectares in 1967 has been by far the largest seeded area.

Table 30.--World wheat production by regions, average 1964-66 and alternative projections for 1980

Region	Average 1964-66	Unbalanced world trade	World grain model				
			I	II	IIA	IA	III
			-1,000 metric tons-				
United States.	35,478	48,450	43,234	42,819	56,052	48,606	43,549
Canada	18,846	23,260	18,584	17,561	27,405	22,530	19,259
Argentina.	7,846	9,590	9,874	10,574	9,228	9,294	8,907
Australia & New Zealand. .	10,207	15,820	11,074	10,446	13,973	13,227	11,426
Major exporters.	72,377	97,120	82,766	81,400	106,658	93,657	83,141
Japan.	1,185	1,560	800	806	788	794	799
EC	28,759	36,260	35,961	35,887	1,273	35,799	36,018
United Kingdom	3,813	4,410	4,462	4,455	34,915	4,457	4,465
Other Western Europe . . .	10,202	12,750	11,172	11,198	4,361	11,168	11,166
South Africa, Rep. of. . .	770	1,000	1,295	1,304	11,039	1,296	1,290
Developed importers. . .	44,729	55,980	53,690	53,650	52,376	53,514	53,738
USSR	63,067	84,300	84,317	84,278	83,569	84,242	84,345
Eastern Europe	20,848	29,850	30,679	30,675	30,556	30,662	30,681
Communist Asia	22,933	32,000	35,978	35,968	35,736	35,973	35,984
Central plan countries .	106,848	146,150	150,974	150,921	149,861	150,877	151,010
Central America & Caribbean	1,894	3,200	3,194	4,006	3,874	3,176	2,729
East South America	803	1,150	1,152	1,310	1,312	1,155	1,046
West South America	1,615	1,900	1,899	2,088	2,041	1,896	1,804
North Africa	4,120	7,200	5,313	5,659	5,509	5,302	5,122
West Africa.	26	40	41	48	47	41	36
East Africa.	484	780	784	926	917	783	693
West Asia.	12,475	19,600	17,866	20,047	19,929	17,838	16,360
South Asia	17,311	43,480	43,616	58,904	59,855	43,593	35,391
Southeast Asia	74	100	104	134	133	104	86
East Asia & Pacific. . . .	332	450	451	508	503	451	415
Less developed	39,134	77,900	74,420	94,630	94,120	74,339	63,682
Total world.	263,088	377,150	361,850	380,601	403,015	372,387	351,571

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Table 31.--World wheat availabilities by regions, average 1964-66 and alternative projections for 1980

Region	Average 1964-66	Unbalanced world trade	World grain model				
			I	II	IIA	IA	III
			-1,000 metric tons-				
United States.	18,637	21,100	22,504	24,893	30,257	24,969	20,796
Canada	4,159	3,620	4,280	4,745	9,374	4,828	3,975
Argentina.	3,863	4,720	4,678	4,420	4,741	4,803	4,825
Australia & New Zealand. .	2,720	2,810	2,798	2,832	2,969	2,837	2,779
Major exporters.	29,379	32,250	34,260	36,890	47,341	37,437	32,375
Japan.	4,759	7,400	7,338	7,272	7,666	7,398	7,347
EC	27,703	31,170	32,081	33,459	36,608	33,639	31,096
United Kingdom	8,166	8,760	8,949	9,028	9,512	8,979	8,900
Other Western Europe . . .	11,501	11,090	10,664	10,626	11,254	10,677	10,666
South Africa, Rep. of. . .	1,136	1,770	1,768	1,764	1,856	1,776	1,771
Developed importers. . .	53,265	60,190	60,800	62,149	66,896	62,469	59,780
USSR	65,475	79,800	79,736	79,694	80,326	79,806	79,750
Eastern Europe	26,563	34,660	32,505	32,517	32,933	32,533	32,497
Communist Asia	28,655	35,500	42,090	42,095	42,307	42,093	42,087
Central plan countries .	120,693	149,960	154,331	154,306	155,566	154,432	154,334
Central America & Caribbean	2,870	5,550	5,478	6,108	6,448	5,502	5,129
East South America	3,813	6,190	6,078	6,314	6,473	6,034	5,990
West South America	2,836	5,350	5,312	5,622	5,824	5,313	5,126
North Africa	7,691	14,280	14,260	15,271	15,448	14,277	13,717
West Africa.	653	1,520	1,524	1,671	1,739	1,526	1,432
East Africa.	789	1,480	1,496	1,629	1,704	1,490	1,407
West Asia.	14,442	23,270	22,874	24,366	24,626	22,935	22,029
South Asia	26,654	49,000	45,995	52,764	53,953	44,764	43,538
Southeast Asia	253	520	535	551	594	536	523
East Asia & Pacific. . . .	2,410	4,580	4,631	4,922	5,227	4,656	4,449
Less developed	62,411	111,740	108,183	119,218	122,036	107,033	103,340
Total world.	265,748	354,140	357,574	372,563	391,839	361,371	349,829
Net increase in stocks, above availabilities in U.S., Canada, & Australia	--	22,000	4,279	8,035	11,174	9,741	1,743

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Table 32.--World wheat trade by regions, average 1964-66 and alternative projections for 1980 1/

Region	Average 1964-66	Unbalanced world trade	World grain model				
			I	II	IIA	IA	III
	- - - - - - - - - - - - - - -1,000 metric tons- - - - - - - - - - - - - -						
United States.	-21,163	-27,350	-19,317	-14,777	-21,828	-20,517	-22,571
Canada	-13,848	-19,640	-11,897	-8,748	-13,569	-13,498	-13,978
Argentina.	-5,063	-4,870	-5,196	-6,154	-4,487	-4,491	-4,082
Australia & New Zealand. .	-6,339	-13,010	-7,818	-6,795	-8,259	-8,099	-8,391
Major exporters.	-46,413	-64,870	-44,228	-36,474	-48,143	-46,605	-49,022
Japan.	3,645	5,840	6,538	6,466	6,878	6,604	6,548
EC	-1,288	-5,090	-3,880	-2,427	1,693	-2,160	-4,923
United Kingdom	4,328	4,350	4,487	4,573	5,151	4,522	4,435
Other Western Europe . . .	1,340	-1,660	-508	-572	215	-491	-500
South Africa, Rep. of. . .	366	770	473	460	583	480	481
Developed importers. . .	8,392	4,210	7,110	8,500	14,520	8,955	6,041
USSR	2,408	-4,500	-4,581	-4,584	-3,243	-4,436	-4,595
Eastern Europe	5,713	4,810	1,826	1,842	2,377	1,871	1,816
Communist Asia	5,722	4,500	6,112	6,127	6,571	6,120	6,103
Central plan countries .	13,845	4,810	3,357	3,385	5,705	3,555	3,324
Central America & Caribbean	976	2,350	2,284	2,102	2,574	2,326	2,400
East South America	3,010	5,040	4,926	5,004	5,161	4,879	4,944
West South America	1,221	3,450	3,413	3,534	3,783	3,417	3,322
North Africa	3,571	7,080	8,947	9,612	9,939	8,975	8,595
West Africa.	627	1,480	1,483	1,623	1,692	1,485	1,396
East Africa.	307	700	712	703	787	707	714
West Asia.	1,947	3,670	5,008	4,319	4,697	5,097	5,669
South Asia	9,343	5,520	2,379	-7,140	-5,902	2,571	8,147
Southeast Asia	179	420	431	417	461	432	437
East Asia & Pacific. . . .	2,078	4,130	4,180	4,414	4,724	4,205	4,034
Less developed	23,257	33,840	33,763	24,588	27,916	34,094	39,658
Total world.	-919	-22,010	2	-1	-2	-1	1

1/ Trade is given on a net trade basis; a minus indicates exports.

Table 33.--Wheat export earnings or import costs by regions, average 1964-66 and alternative projections for 1980 1/

Region	Average 1964-66	Unbalanced world trade	World grain model				
			I	II	IIA	IA	III
			Million dollars				
United States.	1,345.3	1,738.6	1,119.1	812.3	485.2	1,125.3	1,508.6
Canada	937.5	1,329.6	782.2	508.4	319.0	737.4	989.6
Argentina.	293.7	282.5	316.6	333.7	74.8	230.8	262.2
Australia & New Zealand. .	368.9	757.2	462.2	349.3	169.3	446.2	532.2
Major exporters.	2,945.4	4,107.9	2,680.1	2,003.7	1,048.3	2,539.7	3,292.6
Major exporters minus							
Argentina	2,651.7	3,825.4	2,363.5	1,670.0	973.5	2,308.9	3,030.4
Japan.	-264.5	-423.8	-463.0	-413.0	-214.8	-420.0	-495.9
EC	83.2	328.7	245.7	136.8	-39.3	119.3	335.9
United Kingdom	-317.9	-319.4	-300.9	-274.0	-165.3	-292.4	-318.4
Other Western Europe . . .	-96.0	118.9	33.6	33.9	-6.5	31.6	35.5
South Africa, Rep. of. . .	-24.3	-51.2	-33.4	-29.2	-14.7	-27.7	-36.3
Developed importers. . .	-619.5	-346.8	-518.0	-545.5	-440.6	-589.2	-479.2
USSR	-151.7	283.5	306.6	274.9	70.2	241.2	330.1
Eastern Europe	-397.2	-334.3	-122.9	-111.2	-66.9	-113.8	-131.2
Communist Asia	-437.2	-343.8	-443.5	-392.9	-230.4	-414.6	-471.7
Central plan countries .	-986.1	-394.6	-259.8	-229.2	-227.1	-287.2	-272.8
Central America & Caribbean	-73.7	-177.4	-151.5	-124.8	-73.8	-141.9	-171.0
East South America	-220.3	-268.9	-342.5	-313.1	-164.4	-313.4	-368.0
West South America	-90.4	-255.3	-237.7	-220.9	-123.6	-222.6	-247.1
North Africa	-262.5	-520.4	-625.6	-605.3	-319.6	-581.5	-643.2
West Africa.	-57.9	-136.6	-104.9	-103.5	-57.0	-98.3	-105.6
East Africa.	-20.8	-47.7	-50.4	-44.9	-24.1	-44.6	-54.1
West Asia.	-141.4	-266.4	-363.2	-274.8	-155.8	-335.3	-439.0
South Asia	-710.1	-419.5	-173.0	400.7	204.8	-177.9	-632.5
Southeast Asia	-15.0	-35.3	-31.0	-26.0	-16.7	-29.3	-33.8
East Asia & Pacific. . . .	-159.8	-317.6	-300.2	-274.2	-168.0	-285.7	-308.8
Less developed	-1,751.9	-2,545.1	-2,380.0	-1,586.8	-898.2	-2,230.5	-3,003.1
Less developed plus							
Argentina	-1,458.2	-2,262.6	-2,063.4	-1,253.1	-823.4	-1,999.7	-2,740.9

1/ Earnings or cash are on a net basis; a minus indicates costs and a positive number indicates earnings. The earnings or costs are based on trade data given in table 31.

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VIII.--IMPLICATIONS FOR THE LESS DEVELOPED COUNTRIES

> Great minds seeking great ends do not
> stop at detail.   --Duc de La Rochefoucauld

Is wheat a commodity which in 1980 will have good export earnings prospects for the LDC's? From the projection results of this study one would have to conclude very emphatically that it is not. In fact, there are strong indications that development of demand for wheat in the LDC's excluding South Asia might lead to an increase in these countries' import costs for wheat, which seems ironic in the midst of the "Green Revolution."

Given the projected world supply and demand conditions for wheat, the following conclusions are most evident: 53/

Concerted effort of the LDC's to produce exportable supplies of wheat would strain the absorptive capacity of world markets and encounter declining prices. 54/

There may be countries within regions such as North Africa and West Asia where increased domestic production of wheat would be absorbed by internal demand.

Demand for wheat in many of the nonproducing countries is expected to expand rapidly and increased imports will be necessary to meet this demand.

There is an implied need for continued concessional export transaction and some form of aid, especially to those regions where present and foreseeable wheat technology precludes increased wheat production.

More wheat may be used for feed purposes than the projections imply.

Nutritional levels on a calorie basis will be improved.

The LDC's include both importing and exporting countries, rendering it difficult to achieve among themselves a consensus of policy objectives. Lower world prices would benefit importers but would also adversely affect the earnings of the exporters.

Competition in world grain trade will remain very keen.

Stepped up efforts to increase production sufficiency in wheat would tend to override the study projections and reduce the export market in the LDC's. Increased feed use of wheat on the other hand would occur largely in the developed regions, which already have abundant production, so no sizable increase in the export market is expected

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53/ It is the intent of these conclusions to distinguish between efforts to produce exportable supplies and efforts to increase the sufficiency of production for domestic consumption. 54/ Except for Argentina, which would need to weigh carefully its alternatives. Argentina is expected to continue to be one of the major exporters.

from this market area. However, if production of livestock, especially poultry, increases rapidly in the LDC's, there would be potential for larger wheat use if supplies were ample.

Underlying the prospects of increasing import costs in many of the LDC's is the fact that present and foreseeable wheat technology precludes many of the LDC's from growing wheat. Yet the demand for wheat in many of these countries is expected to expand rapidly with rising incomes and population. Imports would have to increase to meet this effective demand. Here lies an implication for assistance from exporting countries. As noted in chapter IV, over half of the wheat imports of the LDC's were concessional transactions. The concessional terms were granted so countries could import food while conserving scarce foreign exchange for capital goods needed for economic development. Therefore, if future LDC imports of wheat increase, it might be implied that there will be a continuing need for concessional terms in order for these countries to purchase wheat. The need is likely to expand as the LDC's are expected to continue to have balance of payments deficits. 55/

One of the dramatic changes occurring during the projection sequence is the shift in the trade position of South Asia from a net importer of 9.3 million tons in the base period and 2.6 million tons in set I (continuing trends) to a net exporter of 7.1 million tons in set II (accelerated production). Several important developments would be implied for this shift to occur.

(1) The wheat produced in South Asia (mainly India and Pakistan) would have to be of a quality acceptable in international trade. For the most part, this region produces soft wheat of a quality not suited to present baking technology. 56/ Therefore, the quality of the wheat produced would probably have to be improved or baking technology would have to change.

(2) Because South Asia's producer prices would be relatively high and world trade prices relatively low, there would have to be a substantial export subsidy for South Asia to sell wheat at international price levels. This cost could be between $300 and $400 million. This is a cost which governments would have to weigh very carefully before deciding to embark on a program whose ultimate objective is to sell wheat on the international market.

(3) If South Asia (or any region) shifts to a position of substantian net exports, it is implied that the traditional exporters (in this case, the United States, Canada, and Australia) will back off from their "share" of the market, no matter how reluctant they might be. This reaction is, in fact, implied in one of the assumptions for the three basic projection sets (I, II, and III), for to maintain buoyant prices there must be some form of international cooperation. All three traditional exporting countries have policies which lead to stock buildups when supplies are large and prices are low. Also, there are production adjustment programs in these countries--mainly in the United States in the past, but more recently in Canada and Australia although to a lesser degree--to curb output during periods of large world supplies.

The set II projections clearly show the implication for traditional exporters when a new major exporter crops up. With net exports from South Asia of 7.1 million tons, the exports of the United States, Canada, and Australia dropped 8.7 million tons or about one-fifth from the level of set I. While part of this dropoff would be due

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55/ Balance of payment deficits are not unique but are more critical to the LDC's, where food imports vie with capital goods necessary for economic development.
56/ Experience in the United States has shown the semidwarf wheat varieties developed in Mexico to have rather poor baking qualities. Quality improvement is one of the objectives of CIMMYT's breeding program (see ch. II).

to a smaller import market, most of it would be due to the entry of a "new marketeer." Even though world demand is greater because of lower prices, the reduction in imports results from increased supplies in the LDC's which more than offset the increased imports of the developed importers.

There is an underlying implication for a rapid expansion in the use of wheat for feed, which though recognized never completely surfaces in these projection sets. It is obscured by the imperceptibility of the future, particularly for policy and wheat technology. Also, it has been obscured by the singleness of this wheat study itself; wheat feeding will be more apparent in the overall grains study (72), which gives more consideration to the livestock sector. Suffice it to say for now that there is a possibility that wheat feeding will expand much faster than implied in the present study. The agronomists have given an impetus through the introduction of the high-yielding semidwarf varieties. Commercial hybrid wheat production is just on the horizon. Already, in the United States and Canada, semidwarf soft wheat varieties are grown specifically for feed. For the LDC producers, wheat has taken the lead in the "Green Revolution." With the development of the livestock sector in the LDC's, wheat would be a potential feed if prices were competitive with other feed prices, which seems likely with the prospects of large world wheat supplies.

Though this study series is not directly concerned with the nutritional needs of the LDC's, it does yield implications for the levels that might be attained by 1980. Of course, wheat is only one item in the food basket, but is one of the most important for the LDC's in the sense that in time of scarcity, it is the major food bought in large quantities via trade, as witnessed by South Asia's imports in 1964-66. However, if the projections of per capita availabilities of wheat are indicative of those of other foods, the national average diets of the LDC's could exceed the minimum nutritional levels at least for calories.

On the average, the projected increase in per capita availabilities for the LDC's ranges from 12 percent under set III (slower production) to 30 percent under set II (accelerated production). 57/ These gains coupled with gains for other foods could very well fill the nutritional deficit. This is not to say that the food problem of the LDC's would be solved, for projected consumption in this study is an outgrowth of effective demand. It is recognized that the effective demand would not cover a substantial portion of the population of many countries and that there would probably need to be food distribution programs in many of these countries for some time to come.

The analyses and projections of this study have borne out the fact that wheat output in the LDC's can increase rapidly. At least for one region--South Asia--the rate of increase might be high enough for production to meet effective domestic demand and still permit a large supply available for export. The wisdom of producing for export has been questioned earlier in this section. If comparative advantage of production is measured by domestic cash prices, the advantage appears to lie in those countries where wheat culture is an extensive rather than intensive enterprise. These countries include exporters of long standing--the United States, Canada, Australia, and Argentina. Even though yields per hectare are generally lower in these countries, scales of production are much larger, a factor which enables growers to sell profitably a kilogram of wheat at a relatively lower price. 58/ Thus, the authors conclude this study with the caution that, because competition on the world wheat market is keen, the successful implementation of a wheat exporting project for the LDC's could prove to be a most costly way for them to earn foreign exchange. Before these countries decide on an increased sufficiency goal, the costs of reaching this objective must be weighed against

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57/ The projected increase is from the level of the base period.
58/ In economic terms, the growers with extensive enterprises would profit from economies of scale.

the cost of importing wheat, and against the alternative use of scarce resources for economic development. Importing wheat might be cheaper than expanding production. Or, importing wheat might be less costly than transporting indigenous wheat long distances via an already overtaxed distribution system.

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Office of Management Services, U.S. Department of Agriculture, Wash., D. C. 20250

APPENDIX A

REGIONAL WHEAT SUPPLY AND DISAPPEARANCE, 1950/51-1969/70

Table A-1.--United States: Wheat supply and disappearance, 1950/51-1969/70

July/June year	Area harvested for grain	Yield, harvested area	Production	Change in stocks	Imports	Exports	Net trade 1/	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	1,000 metric tons						Kilos
1950/51.	24,932	1,110	27,742	-676	323	9,958	-9,635	18,783	123.4
1951/52.	25,040	1,070	26,893	-3,916	859	12,927	-12,068	18,741	121.0
1952/53.	29,191	1,220	35,555	9,513	587	8,640	-8,053	17,989	114.2
1953/54.	27,454	1,160	31,926	8,926	150	5,899	-5,749	17,252	107.7
1954/55.	21,998	1,220	26,778	2,795	114	7,458	-7,344	16,640	102.1
1955/56.	19,138	1,330	25,504	-74	268	9,415	-9,147	16,431	99.0
1956/57.	20,141	1,360	27,363	-3,392	209	14,944	-14,735	16,020	94.8
1957/58.	17,707	1,470	26,011	-748	294	10,950	-10,656	16,103	93.6
1958/59.	21,468	1,850	39,666	11,259	209	12,052	-11,843	16,564	94.7
1959/60.	20,929	1,450	30,420	499	199	13,874	-13,675	16,246	91.4
1960/61.	20,995	1,760	36,870	2,665	220	18,003	-17,783	16,422	90.9
1961/62.	20,870	1,610	33,540	-2,431	156	19,579	-19,423	16,548	90.1
1962/63.	17,680	1,680	29,719	-3,450	146	17,521	-17,375	15,794	84.6
1963/64.	18,416	1,690	31,212	-7,997	107	23,300	-23,191	16,016	84.6
1964/65.	20,139	1,730	34,928	-2,292	31	19,731	-19,700	17,520	91.2
1965/66.	20,057	1,790	35,806	-7,675	25	23,606	-23,581	19,900	102.3
1966/67.	20,185	1,690	35,699	-2,998	48	20,205	-20,157	18,540	94.2
1967/68.	23,785	1,740	41,433	3,112	27	20,711	-20,684	17,637	88.3
1968/69.	22,364	1,920	42,899	7,611	27	14,806	-14,779	20,509	101.3
1969/70.	19,245	2,060	39,705	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available

1/ Minus indicates net exports.

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Table A-2.--Canada: Wheat supply and disappearance, 1950/51-1969/70

July/June year	Area seeded	Yield, seeded area	Production	Change in stocks	Imports	Exports	Net trade 1/	Availability	Per capita availability
	1,000 ha.	Kilos/ha.			1,000 metric tons				Kilos
1950/51.........	10,935	1,150	12,564	2,586	-	6,151	-6,151	3,827	278.6
1951/52.........	10,220	1,470	15,041	1,224	-	9,447	-9,447	4,370	308.8
1952/53.........	10,520	1,820	19,105	3,948	1	10,674	-10,673	4,484	309.3
1953/54.........	10,324	1,670	17,255	5,994	7	7,835	-7,828	3,433	230.6
1954/55.........	9,820	920	9,035	-2,031	10	6,898	-6,888	4,178	272.5
1955/56.........	9,170	1,540	14,130	1,361	-	7,864	-7,864	4,905	311.7
1956/57.........	9,219	1,690	15,596	4,083	1	7,689	-7,688	3,825	237.2
1957/58.........	8,546	1,250	10,688	-2,313	-	8,592	-8,592	4,409	264.4
1958/59.........	8,457	1,280	10,834	-1,769	-	8,175	-8,175	4,428	258.6
1959/60.........	9,334	1,300	12,113	272	-	7,527	-7,527	4,314	246.2
1960/61.........	9,930	1,420	14,108	408	-	9,307	-9,307	4,393	245.3
1961/62.........	10,245	750	7,713	-5,987	-	9,938	-9,938	3,762	205.9
1962/63.........	10,857	1,410	15,392	2,575	-	9,015	-9,015	3,802	204.4
1963/64.........	11,155	1,760	19,689	418	-	15,088	-15,088	4,183	221.0
1964/65.........	12,013	1,360	16,349	324	-	11,904	-11,904	4,108	213.2
1965/66.........	11,458	1,540	17,661	-1,317	-	14,833	-14,833	4,145	211.4
1966/67.........	12,021	1,870	22,517	3,509	1	14,833	-14,832	4,185	209.6
1967/68.........	12,195	1,320	16,137	2,542	-	8,930	-8,930	4,665	229.6
1968/69.........	11,907	1,490	17,686	4,609	-	8,710	-8,710	4,367	211.1
1969/70.........	10,105	1,840	18,623	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

1/ Minus indicates net exports.

Table A-3.--Argentina: Wheat supply and disappearance, 1950/51-1969/70

July/June year	Area harvested	Yield, harvested area	Production	Change in stocks	Imports	Exports	Net trade 1/	Availability	Per capita availability
	1,000 ha.	Kilos/ha.							Kilos
			--------	--------	-------- 1,000 metric tons	--------	--------	--------	
1950/51.	5,241	1,110	5,796	-409	-	2,820	-2,820	3,385	198.3
1951/52.	2,740	770	2,100	-1,360	-	897	-897	2,563	146.6
1952/53.	5,579	1,370	7,633	3,402	208	798	-590	3,641	203.9
1953/54.	4,996	1,240	6,200	-137	-	3,057	-3,057	3,280	180.2
1954/55.	5,462	1,410	7,690	273	-	3,629	-3,629	3,788	204.3
1955/56.	4,062	1,290	5,250	-953	-	3,155	-3,155	3,048	161.3
1956/57.	5,392	1,320	7,100	817	-	2,698	-2,698	3,585	186.2
1957/58.	4,394	1,320	5,810	408	-	2,132	-2,132	3,270	166.7
1958/59.	5,242	1,280	6,720	-408	-	2,804	-2,804	4,324	216.4
1959/60.	4,378	1,330	5,837	-454	-	2,144	-2,144	4,238	208.5
1960/61.	3,599	1,170	4,200	-1,088	-	1,946	-1,946	3,342	161.7
1961/62.	4,198	1,360	5,725	-817	-	2,377	-2,377	4,165	198.2
1962/63.	3,438	1,660	5,700	680	-	1,806	-1,806	3,214	150.5
1963/64.	5,676	1,570	8,940	2,178	-	2,777	-2,777	3,985	183.7
1964/65.	5,795	1,940	11,260	2,422	-	4,254	-4,254	4,584	208.2
1965/66.	4,214	1,320	6,079	-4,285	-	7,845	-7,845	2,519	112.7
1966/67.	5,214	1,200	6,247	-1,330	-	3,090	-3,090	4,487	197.7
1967/68.	5,812	1,200	7,000	2,420	169	1,370	-1,201	3,379	146.3
1968/69.	5,837	980	5,740	-1,205	-	2,666	-2,666	4,279	182.2
1969/70.	5,110	1,330	6,800	n.a.	-	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

1/ Minus indicates net exports.

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Table A-4.--Australia and New Zealand: Wheat supply and disappearance, 1950/51-1969/70

July/June year	Area seeded	Yield, seeded area	Production	Change in stocks 1/	Imports	Exports	Net trade 2/	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - -						Kilos
1950/51.	4,771	1,060	5,147	-544	152	3,475	-3,323	2,368	234.8
1951/52.	4,261	1,040	4,518	-545	220	2,707	-2,487	2,576	248.4
1952/53.	4,268	1,290	5,419	409	185	2,715	-2,530	2,480	233.3
1953/54.	4,402	1,240	5,511	1,632	189	1,941	-1,752	2,127	195.8
1954/55.	4,365	1,060	4,719	137	220	2,544	-2,324	2,258	203.8
1955/56.	4,156	1,290	5,431	626	238	2,774	-2,536	2,269	200.2
1956/57.	3,215	1,150	3,731	-1,851	294	3,424	-3,130	2,452	211.1
1957/58.	3,608	740	2,735	-1,225	302	1,675	-1,373	2,587	218.0
1958/59.	4,242	1,390	5,956	1,769	224	2,050	-1,826	2,361	194.7
1959/60.	4,980	1,100	5,566	272	220	3,165	-2,945	2,349	189.6
1960/61.	5,505	1,370	7,686	136	161	4,999	-4,838	2,712	214.4
1961/62.	6,034	1,130	6,980	-1,415	175	6,277	-6,102	2,293	177.4
1962/63.	6,740	1,250	8,566	1,551	182	4,788	-4,606	2,409	182.6
1963/64.	6,758	1,340	9,173	-1,034	177	7,813	-7,636	2,571	191.1
1964/65.	7,335	1,380	10,311	1,247	166	6,469	-6,303	2,761	201.1
1965/66.	7,162	1,000	7,318	-1,152	149	5,681	-5,532	2,937	209.8
1966/67.	8,508	1,510	12,991	3,348	100	7,282	-7,182	2,461	173.1
1967/68.	9,175	860	7,895	-2,322	48	6,974	-6,926	3,291	227.3
1968/69.	10,972	1,390	15,246	6,942	5	5,369	-5,364	2,940	199.6
1969/70.	9,921	1,150	11,440	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ Australia only. 2/ Minus indicates net exports.

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Table A-5.--Japan: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area seeded	Yield, seeded area	Production	Change in stocks 1/	Imports	Exports	Net trade	Avail- ability	Per capita avail- ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - -						Kilos
1950/51.	746	1,750	1,338	n.a.	1,561	17	1,544	n.a.	n.a.
1951/52.	735	2,030	1,490	n.a.	1,690	29	1,661	n.a.	n.a.
1952/53.	721	2,130	1,537	n.a.	1,235	90	1,145	n.a.	n.a.
1953/54.	686	2,000	1,374	n.a.	2,367	66	2,301	n.a.	n.a.
1954/55.	672	2,260	1,516	-11	1,960	17	1,943	3,470	39.4
1955/56.	663	2,210	1,468	82	2,270	25	2,245	3,631	40.8
1956/57.	658	2,090	1,375	117	2,393	13	2,380	3,638	40.4
1957/58.	617	2,150	1,330	79	2,437	19	2,418	3,669	40.4
1958/59.	599	2,140	1,281	-43	2,457	29	2,428	3,752	41.0
1959/60.	601	2,360	1,416	127	2,566	23	2,543	3,832	41.6
1960/61.	602	2,540	1,531	179	2,834	52	2,782	4,134	44.4
1961/62.	649	2,740	1,781	180	2,773	84	2,689	4,290	45.6
1962/63.	642	2,540	1,631	-244	2,663	84	2,579	4,454	46.9
1963/64.	584	1,230	716	-235	3,919	68	3,851	4,802	50.1
1964/65.	508	2,450	1,244	142	3,546	80	3,564	4,568	47.1
1965/66.	476	2,700	1,287	100	3,553	134	3,419	4,606	47.0
1966/67.	421	2,430	1,024	65	4,260	77	4,183	5,142	52.1
1967/68.	367	2,720	997	42	4,028	122	3,906	4,861	48.8
1968/69.	322	3,140	1,012	n.a.	4,183	116	n.a.	n.a.	n.a.
1969/70.	287	2,640	758	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ Stock changes based on Apr. 1-Mar. 31 data taken from Japan statistical yearbook.

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Table A-6.--European Community: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade 1/	Avail-ability	Per capita avail-ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - -						Kilos
1950/51.	10,334	1,840	18,962	n.a.	5,617	1,151	4,466	n.a.	n.a.
1951/52.	10,258	1,740	17,844	n.a.	6,426	497	5,929	n.a.	n.a.
1952/53.	10,434	1,970	20,515	n.a.	5,534	710	4,824	n.a.	n.a.
1953/54.	10,393	2,120	22,064	n.a.	4,957	1,290	3,667	n.a.	n.a.
1954/55.	10,681	2,040	21,754	n.a.	5,116	2,519	2,597	n.a.	n.a.
1955/56.	10,875	2,240	24,350	750	5,130	3,230	1,900	25,500	155.5
1956/57.	9,064	2,070	18,791	672	6,968	1,390	5,578	23,697	143.2
1957/58.	11,128	2,210	24,590	-844	4,705	3,859	846	26,280	157.3
1958/59.	11,110	2,190	24,334	-288	4,763	2,713	2,050	26,647	158.0
1959/60.	10,786	2,400	25,864	-660	4,054	3,151	903	27,427	161.1
1960/61.	10,658	2,270	24,184	1,097	6,398	2,480	3,918	27,005	157.3
1961/62.	10,089	2,300	23,161	-193	6,622	3,169	3,453	26,807	154.6
1962/63.	10,805	2,740	29,624	1,814	3,903	4,118	-215	27,595	157.3
1963/64.	9,970	2,460	24,570	-2,021	4,516	4,375	141	26,732	150.5
1964/65.	10,628	2,760	29,278	-554	4,058	6,089	-2,031	27,801	154.8
1965/66.	10,624	2,870	30,488	1,167	4,709	6,266	-1,557	27,752	152.8
1966/67.	10,033	2,640	26,522	-1,269	4,407	4,681	-274	27,556	150.8
1967/68.	9,723	3,220	31,350	1,995	4,781	6,053	-1,272	28,083	152.7
1968/69.	10,200	3,180	32,397	2,226	7,021	8,009	-988	29,183	157.6
1969/70.	10,125	3,120	31,558	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ Minus indicates net exports.

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Table A-7.--United Kingdom: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade	Availability	Per capita availability
	1,000 ha.	Kilos/ha.			1,000 metric tons				Kilos
1950/51. . . .	1,003	2,640	2,648	n.a.	4,155	13	4,142	n.a.	n.a.
1951/52. . . .	862	2,730	2,353	n.a.	4,967	18	4,949	n.a.	n.a.
1952/53. . . .	822	2,850	2,344	n.a.	4,751	17	4,734	n.a.	n.a.
1953/54. . . .	897	3,020	2,707	-395	3,916	16	3,900	7,002	137.6
1954/55. . . .	994	2,850	2,828	-396	5,141	21	5,120	8,344	163.4
1955/56. . . .	788	3,350	2,641	75	5,254	22	5,232	7,798	152.2
1956/57. . . .	928	3,120	2,891	-112	4,996	9	4,987	7,990	155.4
1957/58. . . .	855	3,190	2,726	-36	5,112	16	5,096	7,858	152.1
1958/59. . . .	894	3,080	2,755	157	5,300	7	5,293	7,891	152.1
1959/60. . . .	781	3,620	2,830	76	4,468	7	4,461	7,367	141.1
1960/61. . . .	851	3,570	3,040	49	4,711	8	4,703	7,694	146.4
1961/62. . . .	739	3,540	2,614	41	4,692	9	4,683	7,256	137.1
1962/63. . . .	913	4,350	3,974	-16	4,258	143	4,115	8,105	151.6
1963/64. . . .	780	3,910	3,046	98	4,605	19	4,586	7,534	140.0
1964/65. . . .	893	4,250	3,793	-111	4,189	13	4,176	8,080	149.0
1965/66. . . .	1,026	4,070	4,171	162	4,664	13	4,651	8,660	158.6
1966/67. . . .	906	3,840	3,475	-82	4,176	13	4,160	7,720	140.4
1967/68. . . .	933	4,180	3,902	81	4,064	15	4,049	7,870	142.1
1968/69. . . .	978	3,550	3,469	-28	4,573	12	4,561	8,058	144.4
1969/70. . . .	823	4,070	3,353	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

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Table A-8.--Other Western Europe: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks 1/	Imports	Exports	Net trade 2/	Avail- ability	Per capita avail- ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - -						Kilos
1950/51.	6,725	1,060	7,110	n.a.	2,943	86	2,857	n.a.	n.a.
1951/52.	6,823	1,110	7,577	496	2,755	103	2,652	9,733	123.5
1952/53.	6,892	1,160	7,961	-169	2,520	205	2,315	10,455	131.6
1953/54.	7,105	1,090	7,745	-387	2,423	535	1,888	10,020	125.3
1954/55.	7,303	1,310	9,601	877	2,544	255	2,289	11,013	136.8
1955/56.	7,188	1,150	8,265	-140	2,190	145	2,045	10,450	128.8
1956/57.	7,351	1,170	8,632	-224	2,503	311	2,192	11,048	135.3
1957/58.	7,325	1,360	9,943	449	1,978	309	1,669	11,163	135.7
1958/59.	7,316	1,290	9,428	-464	2,116	844	1,272	11,164	134.7
1959/60.	7,416	1,310	9,745	96	1,976	294	1,682	11,331	135.7
1960/61.	7,255	1,200	8,727	-339	2,613	393	2,220	11,286	134.1
1961/62.	6,847	1,260	8,654	47	2,948	489	2,459	11,064	130.4
1962/63.	7,419	1,440	10,716	497	2,351	339	2,012	12,231	142.9
1963/64.	7,139	1,360	9,691	519	1,798	322	1,476	10,648	123.3
1964/65.	7,218	1,400	10,071	-12	1,836	439	1,397	11,480	132.0
1965/66.	7,134	1,490	10,636	864	1,999	481	1,518	11,290	128.8
1966/67.	6,690	1,480	9,899	-570	1,890	784	1,106	11,575	131.1
1967/68.	6,883	1,730	11,896	157	1,345	1,091	254	11,993	134.9
1968/69.	6,673	1,770	11,814	-186	1,326	1,588	-262	11,738	131.1
1969/70.	6,352	1,630	10,344	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ Excludes stock changes of Finland, Greece, Ireland, and Portugal.
2/ Minus indicates net exports.

Table A-9.--Republic of South Africa: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area planted	Yield, planted area	Production	Change in stocks	Imports	Exports	Net trade	Avail- ability	Per capita avail- ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - -						Kilos
1950/51. . . .	1,169	650	759	n.a.	261	10	251	1,010	81.1
1951/52. . . .	1,217	580	710	n.a.	168	12	156	866	67.8
1952/53. . . .	1,205	470	561	n.a.	190	6	184	745	56.9
1953/54. . . .	1,054	560	586	n.a.	345	-	345	931	69.3
1954/55. . . .	1,179	510	602	n.a.	189	-	189	791	57.4
1955/56. . . .	1,161	680	787	n.a.	197	-	179	984	69.8
1956/57. . . .	1,344	620	831	n.a.	72	-	72	903	62.6
1957/58. . . .	1,370	580	790	n.a.	4	1	3	793	53.6
1958/59. . . .	1,117	560	627	n.a.	216	1	215	842	55.5
1959/60. . . .	1,216	610	742	n.a.	286	1	285	1,027	66.1
1960/61. . . .	1,287	600	772	n.a.	73	-	73	845	53.1
1961/62. . . .	1,442	610	875	n.a.	85	-	85	960	59.0
1962/63. . . .	1,409	500	701	n.a.	241	-	241	942	56.6
1963/64. . . .	1,515	580	884	n.a.	164	-	164	1,048	61.5
1964/65. . . .	1,599	670	1,075	n.a.	139	1	138	1,213	69.5
1965/66. . . .	1,637	410	669	n.a.	162	-	162	831	46.5
1966/67. . . .	1,394	410	567	n.a.	800	1	799	1,366	74.7
1967/68. . . .	1,612	680	1,089	n.a.	215	-	215	1,304	69.0
1968/69. . . .	2,141	590	1,272	n.a.	1	-	1	1,273	65.5
1969/70. . . .	2,398	550	1,320	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

Table A-10.--USSR: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade 1/	Avail-ability	Per capita avail-ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - -						Kilos
1950/51.	38,528	720	27,800	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1951/52.	43,023	670	28,985	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1952/53.	46,347	840	38,785	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1953/54.	48,356	760	36,800	n.a.	-	670	-670	36,130	190.7
1954/55.	49,342	740	36,400	n.a.	-	700	-700	35,700	185.3
1955/56.	60,457	700	42,100	n.a.	270	1,016	-746	41,354	210.8
1956/57.	62,010	870	53,900	n.a.	148	4,343	-4,195	49,705	249.0
1957/58.	69,058	720	49,750	n.a.	365	3,909	-3,544	46,206	227.4
1958/59.	66,642	940	62,606	n.a.	230	5,890	-5,660	56,946	275.3
1959/60.	62,997	820	51,718	n.a.	60	5,520	-5,460	46,258	219.7
1960/61.	60,393	770	46,274	n.a.	204	5,058	-4,854	41,420	193.3
1961/62.	63,000	830	52,262	n.a.	-	5,052	-5,052	47,210	216.6
1962/63.	67,411	810	54,400	n.a.	-	5,330	-5,330	49,070	221.6
1963/64.	64,609	620	40,000	n.a.	8,859	1,282	7,577	47,577	211.7
1964/65.	67,887	850	57,700	n.a.	2,656	1,159	1,497	59,197	260.0
1965/66.	70,200	660	46,500	n.a.	9,187	2,201	6,986	53,486	231.9
1966/67.	69,958	1,210	85,000	n.a.	4,683	4,126	557	85,557	366.5
1967/68.	67,026	960	64,000	n.a.	1,534	5,084	-3,550	60,450	255.8
1968/69.	67,231	1,140	76,600	n.a.	1,000	5,000	-4,000	72,600	303.4
1969/70.	65,000	1,000	65,200	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not readily available.

1/ Minus indicates net exports.

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Table A-11.--Eastern Europe: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade	Avail- ability	Per capita avail- ability
	1,000 ha.	Kilos/ha.	1,000 metric tons						Kilos
1950/51	10,113	1,240	12,508	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1951/52	10,175	1,530	15,566	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1952/53	10,142	1,330	13,505	n.a.	n.a.	165	n.a.	n.a.	n.a.
1953/54	10,050	1,560	15,690	n.a.	n.a.	486	n.a.	n.a.	n.a.
1954/55	9,804	1,140	11,131	n.a.	3,218	625	2,594	13,725	124.1
1955/56	10,125	1,420	14,423	n.a.	3,450	453	2,997	17,420	155.7
1956/57	9,844	1,260	12,440	n.a.	3,721	365	3,356	15,796	139.9
1957/58	10,227	1,600	16,379	n.a.	4,476	89	4,387	20,766	182.4
1958/59	10,238	1,400	14,300	n.a.	5,356	266	5,090	19,390	168.9
1959/60	10,216	1,770	18,071	n.a.	5,447	428	5,019	23,090	199.3
1960/61	9,627	1,710	16,491	n.a.	5,170	193	4,977	21,468	183.9
1961/62	9,675	1,730	16,715	n.a.	5,588	240	5,348	22,063	187.4
1962/63	10,001	1,740	17,407	n.a.	5,834	51	5,783	23,190	195.9
1963/64	9,865	1,780	17,527	n.a.	6,686	495	6,191	23,718	198.3
1964/65	10,255	1,760	18,042	n.a.	6,571	87	6,484	24,526	203.5
1965/66	9,867	2,230	21,981	n.a.	6,765	597	6,168	28,149	231.8
1966/67	10,096	2,230	22,521	n.a.	5,547	1,053	4,494	27,015	220.6
1967/68	10,237	2,480	25,360	n.a.	4,657	1,657	3,000	28,360	229.2
1968/69	10,670	2,370	25,309	n.a.	4,527	1,000	3,527	28,836	231.0
1969/70	10,358	2,490	25,744	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

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Table A-12.--Communist Asia: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area planted	Yield, planted area	Production	Change in stocks	Imports	Exports	Net trade	Avail- ability	Per capita avail- ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - - -						Kilos
1950/51.	22,800	640	14,500	n.a.	n.a.	n.a.	n.a.	14,500	25.5
1951/52.	23,055	750	17,250	n.a.	n.a.	n.a.	n.a.	17,250	29.7
1952/53.	24,780	730	18,100	n.a.	n.a.	n.a.	n.a.	18,100	30.6
1953/54.	25,636	710	18,300	n.a.	n.a.	n.a.	n.a.	18,300	30.2
1954/55.	26,967	870	23,350	n.a.	n.a.	n.a.	n.a.	23,500	37.9
1955/56.	26,739	860	23,000	n.a.	n.a.	n.a.	n.a.	23,000	36.2
1956/57.	27,272	910	24,800	n.a.	n.a.	n.a.	n.a.	24,800	38.1
1957/58.	27,541	860	23,600	n.a.	70	-	70	23,670	35.5
1958/59.	26,623	900	24,000	n.a.	55	-	55	24,055	35.3
1959/60.	24,300	1,000	24,300	n.a.	15	-	15	24,315	24.9
1960/61.	27,800	800	22,200	n.a.	2,100	-	2,100	24,300	34.0
1961/62.	24,600	670	16,500	n.a.	4,720	-	4,720	21,220	29.1
1962/63.	24,400	820	20,000	n.a.	5,016	-	5,016	25,016	33.6
1963/64.	24,200	900	21,800	n.a.	5,265	-	5,265	27,065	35.5
1964/65.	25,500	1,000	25,500	n.a.	5,136	-	5,136	30,636	39.3
1965/66.	25,000	900	22,500	n.a.	6,624	3	6,621	29,121	36.6
1966/67.	24,500	850	20,800	n.a.	5,440	30	5,410	26,210	32.2
1967/68.	24,500	940	23,000	n.a.	4,196	10	4,186	27,186	32.8
1968/69.	24,500	860	21,000	n.a.	4,500	-	4,500	25,500	30.2
1969/70.	23,500	950	22,300	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

Table A-13.--Central America and Caribbean: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area 1/	Yield 2/	Production 1/	Change in stocks	Imports	Exports	Net trade	Avail-ability	Per capita avail-ability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - 1,000 metric tons - - - - - - - - - - -						Kilos
1950/51. . . .	675	910	601	n.a.	999	—	999	1,600	30.8
1951/52. . . .	715	880	609	n.a.	1,114	—	1,114	1,723	32.3
1952/53. . . .	629	860	533	n.a.	1,084	—	1,084	1,617	29.6
1953/54. . . .	695	1,020	692	n.a.	833	—	833	1,525	27.1
1954/55. . . .	798	1,100	858	n.a.	667	—	667	1,525	26.4
1955/56. . . .	834	1,060	870	n.a.	859	—	859	1,729	29.1
1956/57. . . .	272	1,330	1,265	n.a.	745	—	745	2,010	32.9
1957/58. . . .	990	1,440	1,398	n.a.	821	—	821	2,219	35.3
1958/59. . . .	873	1,590	1,360	n.a.	820	—	820	2,180	33.8
1959/60. . . .	980	1,340	1,289	n.a.	945	—	945	2,234	33.5
1960/61. . . .	847	1,460	1,213	n.a.	830	—	830	2,043	29.8
1961/62. . . .	770	1,900	1,424	n.a.	1,040	—	1,040	2,464	34.8
1962/63. . . .	768	2,040	1,527	n.a.	1,330	—	1,330	2,857	39.2
1963/64. . . .	847	2,100	1,723	n.a.	1,288	480	808	2,531	33.7
1964/65. . . .	852	2,330	1,930	n.a.	1,287	414	873	2,803	36.1
1965/66. . . .	869	2,510	2,119	n.a.	1,345	480	865	2,984	37.3
1966/67. . . .	672	2,530	1,634	n.a.	1,354	69	1,285	2,919	35.3
1967/68. . . .	799	2,700	2,091	n.a.	1,459	262	1,197	3,288	38.6
1968/69. . . .	756	2,500	1,827	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70. . . .	745	2,800	2,036	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

1/ Mexico and Guatemala only.
2/ Mexico only.

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Table A-14.--East South America: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Pro- duction	Change in stocks	Imports	Exports	Net trade	Availa- bility	Per capita availa- bility
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - -1,000 metric tons- - - - - - - - - - - - -						Kilos
1950/51.	1,149	750	863	n.a.	1,668	87	1,581	2,444	39.8
1951/52.	1,310	640	837	n.a.	1,643	99	1,544	2,381	37.7
1952/53.	1,325	770	1,015	n.a.	1,683	172	1,511	2,526	38.8
1953/54.	1,515	1,010	1,531	n.a.	1,956	123	1,833	3,364	50.2
1954/55.	1,554	950	1,482	n.a.	1,931	527	1,404	2,886	41.8
1955/56.	2,000	820	1,643	n.a.	2,062	497	1,565	3,208	45.0
1956/57.	2,002	780	1,565	n.a.	1,922	331	1,591	3,156	42.9
1957/58.	1,918	720	1,387	n.a.	1,762	204	1,558	2,945	38.9
1958/59.	1,576	490	775	n.a.	2,442	164	2,278	3,053	39.1
1959/60.	1,163	490	568	n.a.	2,541	20	2,521	3,089	38.4
1960/61.	1,287	600	779	n.a.	2,440	-	2,440	3,219	38.8
1961/62.	1,014	580	587	n.a.	2,818	-	2,818	3,405	39.9
1962/63.	989	740	737	n.a.	2,835	-	2,835	3,572	40.6
1963/64.	811	460	370	n.a.	2,398	49	2,349	2,719	30.0
1964/65.	901	1,020	918	n.a.	3,019	10	3,009	3,927	42.1
1965/66.	693	1,160	803	n.a.	2,915	142	2,773	3,576	37.2
1966/67.	795	870	687	n.a.	3,327	78	3,249	3,936	39.9
1967/68.	652	790	517	n.a.	3,402	-	3,402	3,919	38.5
1968/69.	1,324	890	1,181	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	1,367	1,050	1,431	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

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Table A-15.--West South America: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Pro- duction	Change in stocks	Imports	Exports	Net trade	Availa- bility	Per capita availa- bility
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - -1,000 metric tons- - - - - - - - - - - - - - - -						Kilos
1950/51.	1,235	950	1,177	n.a.	631	-	631	1,808	56.6
1951/52.	1,288	1,040	1,339	n.a.	551	-	551	1,890	57.8
1952/53.	1,253	1,030	1,295	n.a.	653	-	653	1,948	58.2
1953/54.	1,247	1,090	1,357	n.a.	868	-	868	2,225	64.8
1954/55.	1,250	1,040	1,305	n.a.	759	-	759	2,064	58.6
1955/56.	1,273	1,160	1,475	n.a.	668	-	668	2,143	59.2
1956/57.	1,232	1,160	1,425	n.a.	658	-	658	2,086	56.1
1957/58.	1,227	1,000	1,225	n.a.	484	-	484	1,708	44.7
1958/59.	1,254	1,300	1,633	n.a.	582	-	582	2,195	56.0
1959/60.	1,345	1,180	1,584	n.a.	717	-	717	2,282	56.6
1960/61.	1,335	1,150	1,532	n.a.	757	-	757	2,265	54.7
1961/62.	1,301	1,200	1,564	n.a.	894	-	894	2,434	57.2
1962/63.	1,316	1,160	1,525	n.a.	864	-	864	2,373	54.2
1963/64.	1,245	1,310	1,627	n.a.	991	1	990	2,613	58.1
1964/65.	1,240	1,340	1,656	n.a.	979	-	979	2,635	56.9
1965/66.	1,241	1,340	1,660	n.a.	1,204	-	1,202	2,862	60.1
1966/67.	1,186	1,300	1,535	n.a.	1,429	-	1,429	2,964	60.5
1967/68.	1,081	1,420	1,532	n.a.	1,437	-	1,437	2,969	59.0
1968/69.	1,068	1,480	1,578	n.a.	n.a.	-	n.a.	n.a.	n.a.
1969/70.	1,117	1,390	1,554	n.a.	n.a.	-	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

Table A-16.--North Africa: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	1,000 metric tons						Kilos
1950/51. . . .	4,052	820	3,318	n.a.	1,090	299	791	4,109	79.4
1951/52. . . .	4,640	700	3,265	n.a.	1,338	79	1,259	4,524	85.3
1952/53. . . .	5,063	750	3,786	n.a.	1,188	332	856	4,642	85.4
1953/54. . . .	5,013	870	4,368	n.a.	464	311	153	4,521	81.0
1954/55. . . .	5,735	880	5,037	n.a.	202	430	228	4,809	84.4
1955/56. . . .	5,403	770	4,154	n.a.	730	351	379	4,533	77.7
1956/57. . . .	5,348	870	4,655	n.a.	1,117	168	949	5,604	93.8
1957/58. . . .	5,327	770	4,084	n.a.	1,366	192	1,174	5,258	85.9
1958/59. . . .	5,649	780	4,419	n.a.	1,984	174	1,810	6,229	99.3
1959/60. . . .	5,586	730	4,093	n.a.	2,404	345	2,059	6,152	95.7
1960/61. . . .	5,768	790	4,579	n.a.	2,029	149	1,880	6,459	98.2
1961/62. . . .	4,915	620	3,045	n.a.	3,424	50	3,374	6,419	95.1
1962/63. . . .	4,901	980	4,791	n.a.	2,606	185	2,421	7,212	104.2
1963/64. . . .	5,437	920	5,002	n.a.	2,416	190	2,226	7,228	101.9
1964/65. . . .	5,540	790	4,352	n.a.	2,922	48	2,874	7,226	99.2
1965/66. . . .	5,742	790	4,543	n.a.	3,164	110	3,054	7,597	101.5
1966/67. . . .	4,693	740	3,466	n.a.	4,856	70	4,786	8,252	107.7
1967/68. . . .	5,629	770	4,290	n.a.	4,892	22	4,870	9,160	115.0
1968/69. . . .	5,760	1,040	6,000	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70. . . .	5,500	890	4,890	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

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Table A-17.--West Africa: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Pro- duction	Change in stocks	Imports	Exports	Net trade	Availa- bility	Per capita availa- bility
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - - -						Kilos
1950/51.	n.a.	n.a.	11	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1951/52.	n.a.	n.a.	13	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1952/53.	n.a.	n.a.	14	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1953/54.	n.a.	n.a.	14	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1954/55.	n.a.	n.a.	17	n.a.	295	13	282	299	3.0
1955/56.	n.a.	n.a.	14	n.a.	309	7	302	316	3.1
1956/57.	n.a.	n.a.	18	n.a.	387	13	374	392	3.7
1957/58.	n.a.	n.a.	19	n.a.	363	12	351	370	3.4
1958/59.	n.a.	n.a.	19	n.a.	346	12	334	353	3.2
1959/60.	n.a.	n.a.	19	n.a.	373	17	356	375	3.3
1960/61.	n.a.	n.a.	17	n.a.	376	19	357	374	3.2
1961/62.	n.a.	n.a.	23	n.a.	462	21	441	464	3.9
1962/63.	n.a.	n.a.	23	n.a.	386	22	364	387	3.2
1963/64.	n.a.	n.a.	26	n.a.	400	24	376	402	3.2
1964/65.	n.a.	n.a.	23	n.a.	494	36	458	479	3.7
1965/66.	n.a.	n.a.	27	n.a.	656	25	631	662	5.0
1966/67.	n.a.	n.a.	29	n.a.	825	32	793	822	6.0
1967/68.	n.a.	n.a.	33	n.a.	580	n.a.	n.a.	n.a.	n.a.
1968/69.	n.a.	n.a.	34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	n.a.	n.a.	31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

Table A-18.--East Africa: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	— — — — — — — — — — — — — — 1,000 metric tons — — — — — — — — — — — — —						Kilos
1950/51.	n.a.	n.a.	307	n.a.	85	1	84	392	6.4
1951/52.	n.a.	n.a.	324	n.a.	104	1	103	427	6.7
1952/53.	n.a.	n.a.	315	n.a.	76	3	73	388	6.2
1953/54.	n.a.	n.a.	326	n.a.	81	n.a.	81	407	6.2
1954/55.	n.a.	n.a.	331	n.a.	149	5	144	475	7.1
1955/56.	n.a.	n.a.	331	n.a.	140	1	139	470	6.9
1956/57.	n.a.	n.a.	333	n.a.	194	1	193	526	7.5
1957/58.	n.a.	n.a.	338	n.a.	203	1	202	540	7.6
1958/59.	n.a.	n.a.	338	n.a.	218	5	213	551	7.6
1959/60.	n.a.	n.a.	406	n.a.	195	1	194	600	8.1
1960/61.	n.a.	n.a.	385	n.a.	219	4	215	600	7.9
1961/62.	n.a.	n.a.	367	n.a.	260	3	257	624	8.0
1962/63.	n.a.	n.a.	410	n.a.	288	4	284	694	8.7
1963/64.	n.a.	n.a.	435	n.a.	278	3	275	710	8.7
1964/65.	n.a.	n.a.	460	n.a.	201	14	187	647	7.8
1965/66.	n.a.	n.a.	471	n.a.	291	43	248	719	8.5
1966/67.	n.a.	n.a.	535	n.a.	470	28	442	977	11.3
1967/68.	n.a.	n.a.	605	n.a.	333	36	297	902	10.2
1968/69.	n.a.	n.a.	608	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	n.a.	n.a.	606	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

Table A-19.--West Asia: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area	Yield	Production	Change in stocks	Imports	Exports	Net trade 1/	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - -						Kilos
1950/51.	8,040	990	7,947	n.a.	420	263	157	8,104	136.7
1951/52.	8,360	1,020	8,563	n.a.	677	222	455	9,018	147.8
1952/53.	9,204	1,120	10,293	n.a.	585	750	-165	10,128	161.2
1953/54.	10,508	1,150	12,152	n.a.	609	1,178	-569	11,583	178.3
1954/55.	10,699	850	9,071	n.a.	1,008	738	270	9,341	142.9
1955/56.	11,254	880	9,910	n.a.	1,152	308	844	10,754	160.5
1956/57.	11,634	880	10,274	n.a.	1,340	327	1,013	11,287	164.4
1957/58.	11,977	1,010	12,196	n.a.	1,274	444	830	13,026	183.3
1958/59.	11,078	1,000	11,071	n.a.	1,072	453	619	11,690	160.2
1959/60.	11,870	930	10,184	n.a.	1,878	174	1,704	11,888	158.5
1960/61.	10,711	1,000	10,810	n.a.	2,382	38	2,344	13,154	170.6
1961/62.	10,934	960	10,518	n.a.	2,877	85	2,792	13,310	168.3
1962/63.	11,645	1,030	12,166	n.a.	2,121	329	1,792	13,958	172.0
1963/64.	12,020	1,030	12,509	n.a.	1,904	155	1,749	14,258	171.1
1964/65.	11,810	990	11,733	n.a.	2,007	224	1,783	13,516	157.9
1965/66.	12,167	1,040	12,661	n.a.	2,097	27	2,070	14,731	167.6
1966/67.	12,105	1,060	12,808	n.a.	2,140	54	2,086	14,894	165.3
1967/68.	12,340	1,230	15,165	n.a.	1,783	24	1,759	16,924	183.2
1968/69.	n.a.	n.a.	15,214	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	n.a.	n.a.	14,529	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ Minus indicates net exports.

Table A-20.--South Asia: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area 1/	Yield 1/	Produc- tion 2/	Change in stocks	Imports	Exports	Net trade	Availa- bility 3/	Per capita availa- bility 3/
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - - -						Kilos
1950/51.	13,981	770	12,471	n.a.	2,310	180	2,130	14,601	31.7
1951/52.	14,154	770	12,747	n.a.	4,390	-	4,390	17,137	36.5
1952/53.	13,617	690	11,280	n.a.	2,629	-	2,629	13,909	29.0
1953/54.	13,685	730	12,138	n.a.	1,806	6	1,800	13,938	28.5
1954/55.	14,936	790	13,871	n.a.	861	-	861	14,732	29.5
1955/56.	15,562	790	14,400	n.a.	599	3	596	14,996	29.4
1956/57.	16,926	720	14,357	n.a.	3,098	8	3,090	17,447	33.6
1957/58.	18,267	720	15,149	n.a.	4,204	1	4,202	19,352	36.5
1958/59.	16,382	700	13,825	n.a.	4,351	-	4,351	18,176	33.5
1959/60.	17,486	790	16,129	n.a.	4,771	-	4,771	20,900	37.7
1960/61.	18,314	780	16,539	n.a.	5,166	-	5,166	21,705	38.3
1961/62.	17,623	840	17,123	n.a.	4,217	-	4,217	21,340	36.8
1962/63.	18,552	870	18,480	n.a.	5,625	-	5,625	24,105	40.6
1963/64.	18,753	800	16,991	n.a.	6,084	2	6,082	23,073	37.9
1964/65.	18,572	760	16,300	n.a.	8,958	5	8,953	25,255	40.5
1965/66.	18,831	900	19,198	n.a.	9,041	2	9,039	28,237	44.2
1966/67.	17,866	800	16,409	n.a.	8,887	2	8,885	25,294	38.7
1967/68.	18,255	860	18,317	n.a.	9,360	-	9,360	27,677	41.3
1968/69.	21,059	1,090	26,100	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	22,003	1,150	28,162	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

1/ India and Pakistan only. India data are for harvested area; Pakistan data are for seeded area. 2/ India, Pakistan, and Afghanistan. 3/ Total region.

Table A-21.--Southeast Asia: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area 1/	Yield 1/	Production 1/	Change in stocks	Imports	Exports	Net trade	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	- - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - -						Kilos
1950/51.	17	530	9	n.a.	96	-	96	105	1.9
1951/52.	17	590	10	n.a.	97	-	97	107	1.9
1952/53.	19	580	11	n.a.	122	-	122	133	2.3
1953/54.	17	650	11	n.a.	103	-	103	114	1.9
1954/55.	26	270	7	n.a.	132	-	132	139	2.3
1955/56.	16	620	10	n.a.	128	-	128	138	2.2
1956/57.	18	500	9	n.a.	197	-	197	206	3.2
1957/58.	19	470	9	n.a.	103	-	103	112	1.7
1958/59.	23	440	10	n.a.	175	-	175	185	2.7
1959/60.	33	360	12	n.a.	165	-	165	177	2.5
1960/61.	30	500	15	n.a.	175	-	175	190	2.7
1961/62.	29	480	14	n.a.	167	-	167	181	2.5
1962/63.	33	460	15	n.a.	190	-	190	205	2.7
1963/64.	66	500	33	n.a.	186	-	186	219	2.8
1964/65.	88	610	54	n.a.	138	-	138	192	2.4
1965/66.	121	590	72	n.a.	201	10	191	263	3.2
1966/67.	166	580	97	n.a.	225	15	210	307	3.7
1967/68.	151	470	67	n.a.	194	-	194	261	3.1
1968/69.	95	540	51	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	61	410	25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: Dash indicates zero or negligible; n.a. indicates data not available.

1/ Burma only.

Table A-22.--East Asia and Pacific: Wheat supply and disappearance, 1950/51 to 1969/70

July/June year	Area 1/	Yield 1/	Production 1/	Change in Stocks	Imports	Exports	Net trade	Availability	Per capita availability
	1,000 ha.	Kilos/ha.	- - - - - -	- - - - - -	- - - - 1,000 metric tons - - - -		- - - - -	- - - - -	Kilos
1950/51.	n.a.	n.a.	209	n.a.	677	53	624	833	6.1
1951/52.	n.a.	n.a.	113	n.a.	893	41	852	965	6.9
1952/53.	n.a.	n.a.	166	n.a.	928	26	902	1,068	7.5
1953/54.	n.a.	n.a.	180	n.a.	1,070	29	1,041	1,221	8.3
1954/55.	n.a.	n.a.	254	n.a.	1,063	33	1,030	1,284	8.6
1955/56.	134	1,640	220	n.a.	1,151	28	1,123	1,343	8.8
1956/57.	139	1,760	245	n.a.	1,562	53	1,509	1,754	11.2
1957/58.	164	1,550	254	n.a.	1,553	52	1,501	1,755	10.9
1958/59.	150	1,750	263	n.a.	1,455	45	1,410	1,673	10.1
1959/60.	148	2,090	310	n.a.	1,872	47	1,825	2,135	12.6
1960/61.	149	2,040	304	n.a.	1,719	45	1,674	1,978	11.3
1961/62.	146	2,220	324	n.a.	1,679	45	1,634	1,958	10.9
1962/63.	153	2,030	310	n.a.	2,146	53	2,093	2,403	13.1
1963/64.	154	1,600	247	n.a.	2,294	41	2,253	2,500	13.3
1964/65.	156	2,110	329	n.a.	2,077	71	2,006	2,334	12.1
1965/66.	163	1,980	323	n.a.	2,243	58	2,185	2,508	12.6
1966/67.	168	2,050	344	n.a.	2,175	60	2,042	2,386	11.7
1967/68.	164	2,040	334	n.a.	2,891	63	2,828	3,162	15.1
1968/69.	165	2,190	362	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1969/70.	171	2,230	381	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. indicates data not available.

1/ South Korea and Taiwan only. Data for Korea prior to 1955/56 are not comparable to later data.

APPENDIX B

WHEAT: DOMESTIC UTILIZATION

Table B-1.--United States: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - -1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1954/55.	1,702	12,873	1,700	16,275	10.5	79.1	10.4
1955/56.	898	12,846	1,796	15,540	5.8	82.6	11.6
1956/57.	2,068	12,737	1,714	16,519	12.5	77.1	10.4
1957/58.	816	12,791	1,743	15,350	5.3	83.3	11.4
1958/59.	1,660	13,118	1,715	16,493	10.1	79.5	10.4
1959/60.	1,878	13,254	1,714	16,846	11.1	78.7	10.2
Average 1955/56- 1959/60	1,464	12,949	1,737	16,150	9.1	80.2	10.7
1960/61.	163	13,308	1,742	15,213	1.1	87.5	11.4
1961/62.	980	13,472	1,578	16,030	6.1	84.1	9.8
1962/63.	2,096	13,281	1,633	17,010	12.3	78.1	9.6
1963/64.	816	13,581	1,687	16,084	5.1	84.4	10.5
1964/65.	599	13,744	1,742	16,085	3.7	85.5	10.8
Average 1960/61- 1964/65	931	13,477	1,676	16,084	5.8	83.8	10.4
1965/66.	3,484	13,934	1,687	19,105	18.2	72.9	8.8

Source: (83).

Table B-2.--Canada: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - -1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1954/55.	2,066	1,442	906	4,414	46.8	32.7	20.5
1955/56.	2,124	1,396	946	4,466	47.6	31.2	21.2
1956/57.	1,909	1,404	901	4,214	45.3	33.3	21.4
1957/58.	1,947	1,425	915	4,287	45.4	33.2	21.4
1958/59.	2,022	1,440	1,001	4,463	45.3	32.3	22.4
1959/60.	1,770	1,477	1,004	4,251	41.6	34.8	23.6
Average 1955/56- 1959/60	1,954	1,428	954	4,336	45.1	32.9	22.0
1960/61.	1,721	1,509	1,040	4,270	40.3	35.3	24.4
1961/62.	1,199	1,582	1,088	3,369	35.6	47.0	32.3
1962/63.	1,207	1,420	1,129	3,756	32.1	37.8	30.1
1963/64.	1,470	1,588	1,207	4,265	34.5	37.2	28.3
1964/65.	1,250	1,554	1,153	3,957	31.6	39.3	29.1
Average 1960/61- 1964/65	1,369	1,531	1,123	4,023	34.0	38.1	27.9
1965/66.	1,421	1,639	1,210	4,270	33.3	38.4	28.3

Source: (83).

Table B-3.--Japan: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - -1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1954/55.	203	3,088	372	3,663	5.5	84.3	10.2
1955/56.	262	2,954	402	3,618	7.2	81.6	11.1
1956/57.	212	2,836	428	3,476	6.1	81.6	12.3
1957/58.	272	2,975	358	3,605	7.5	82.5	10.0
1958/59.	264	2,959	359	3,582	7.4	82.6	10.0
1959/60.	313	3,112	366	3,791	8.2	82.1	9.7
Average 1955/56- 1959/60	265	2,967	382	3,614	7.3	82.1	10.6
1960/61.	468	3,125	372	3,965	11.8	78.8	9.4
1961/62.	616	3,207	367	4,190	14.7	76.5	8.8
1962/63.	646	3,253	372	4,271	15.1	76.2	8.7
1963/64.	520	3,404	366	4,290	12.1	79.3	8.5
1964/65.	534	3,593	378	4,505	11.8	79.8	8.4
Average 1960/61- 1964/65	557	3,316	371	4,244	13.1	78.1	8.7
1965/66.	530	3,700	401	4,631	11.4	79.9	8.6

Source: (83).

Table B-4.--France: Domestic utilization of wheat, 1955/56-1965/66

Year 1/	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - 1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1955/56.	2,024	5,939	1,067	9,030	22.4	64.8	11.8
1956/57.	590	5,555	879	7,024	8.4	79.1	12.5
1957/58.	2,113	5,930	885	8,928	23.7	66.4	9.9
1958/59.	2,485	6,068	859	9,412	26.4	64.5	9.1
1959/60.	3,276	5,858	842	9,976	32.8	58.7	8.4
Average 1955/56- 1959/60	2,098	5,870	906	8,874	23.6	66.1	10.2
1960/61.	2,715	5,998	783	9,496	28.6	63.2	8.2
1961/62.	2,046	5,918	892	8,856	23.1	66.8	10.1
1962/63.	3,183	5,952	958	10,093	31.5	59.0	9.5
1963/64.	2,703	5,767	836	9,306	29.0	62.0	9.0
1964/65.	3,660	5,596	855	10,111	36.2	55.3	8.5
Average 1960/61- 1964/65	2,861	5,846	865	9,572	29.9	61.1	9.0
1965/66.	3,587	5,673	770	10,030	35.8	56.6	7.7

1/ Data for 1954/55 were not available in comparable form.

Source: (83).

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Table B-5.--Italy: Domestic utilization of wheat, 1954/55-1966/67

Year	:	Feed	:	Food	:	Other	:	Total	:	Share of total		
									:	Feed	:	Food	:	Other
	:		- - - - - -1,000 metric tons- - - - - -.							- - - - - -Percent- - - - -

Year	Feed	Food	Other	Total	Feed	Food	Other
1954/55.	60	7,796	965	8,821	.7	88.4	10.9
1955/56.	66	7,779	897	8,742	.8	89.0	10.3
1956/57.	60	7,818	908	8,786	.7	89.0	10.3
1957/58.	67	7,826	882	8,775	.8	89.2	10.0
1958/59.	255	7,845	879	8,979	2.8	87.4	9.8
1959/60.	136	7,901	1,019	9,056	1.5	87.2	11.3
Average 1955/56- 1959/60	117	7,834	917	8,868	1.3	88.3	10.3
1960/61.	120	7,950	932	9,002	1.3	88.3	10.4
1961/62.	70	8,175	792	9,037	.8	90.5	8.8
1962/63.	75	8,232	834	9,141	.8	90.1	9.1
1963/64.	65	8,406	808	9,279	.7	90.6	8.7
1964/65.	74	8,475	813	9,362	.8	90.5	8.7
Average 1960/61- 1964/65	81	8,248	835	9,164	.9	90.0	9.1
1965/66.	96	8,648	796	9,540	1.0	90.6	8.3
1966/67.	90	8,668	797	9,555	.9	90.7	8.3

Source: (83).

Table B-6.--West Germany: Domestic utilization of wheat, 1954/55-1966/67

Year	:	Feed	:	Food	:	Other	:	Total	:	Share of total		
									:	Feed	:	Food	:	Other
	:		- - - - - -1,000 metric tons- - - - - -							- - - - - -Percent- - - - -

Year	Feed	Food	Other	Total	Feed	Food	Other
1954/55.	968	4,174	251	5,393	17.9	77.4	4.7
1955/56.	1,134	4,156	282	5,572	20.4	74.6	5.1
1956/57.	1,142	4,108	284	5,534	20.6	74.2	5.1
1957/58.	1,385	4,056	320	5,761	24.0	70.4	5.6
1958/59.	1,329	3,975	296	5,600	23.7	71.0	5.3
1959/60.	1,517	3,946	316	5,779	26.2	68.3	5.5
Average 1955/56- 1959/60	1,301	4,048	300	5,649	23.0	71.6	5.3
1960/61.	1,603	3,940	317	5,860	27.4	67.2	5.4
1961/62.	1,835	3,876	361	6,072	30.2	63.8	5.9
1962/63.	1,620	3,820	329	5,769	28.1	66.2	5.7
1963/64.	1,755	3,771	356	5,882	29.8	64.1	6.1
1964/65.	1,663	3,794	356	5,813	28.6	65.3	6.1
Average 1960/61- 1964/65	1,695	3,840	344	5,879	28.8	65.3	5.8
1965/66.	1,606	3,833	349	5,788	27.7	66.2	6.0
1966/67.	1,668	3,723	306	5,697	29.3	65.4	5.4

Source: (83).

Table B-7.--Netherlands: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - -1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1954/55.	68	1,085	31	1,184	5.7	91.6	2.6
1955/56.	66	1,104	35	1,205	5.5	91.6	2.9
1956/57.	95	1,094	34	1,227	7.7	89.5	2.8
1957/58.	269	1,114	35	1,418	19.0	78.6	2.4
1958/59.	268	1,087	36	1,391	19.3	78.1	2.6
1959/60.	446	1,060	39	1,545	28.9	68.6	2.5
Average 1955/56- 1959/60	229	1,093	35	1,357	16.9	80.5	2.6
1960/61.	358	1,072	38	1,468	24.4	73.0	2.6
1961/62.	479	1,099	39	1,617	29.6	68.0	2.4
1962/63.	170	1,027	35	1,232	13.8	83.4	2.8
1963/64.	118	1,043	14	1,198	9.8	87.1	1.2
1964/65.	96	1,007	40	1,143	8.4	88.1	3.5
Average 1960/61- 1964/65	244	1,050	38	1,332	18.3	78.8	2.9
1965/66.	47	1,000	42	1,089	4.3	91.8	3.9

Source: (83).

Table B-8.--Belgium-Luxembourg: Domestic utilization of wheat, 1955/56-1965/66

Year 1/	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - -1,000 metric tons- - - - - -				- - - - - -Percent- - - - - -		
1955/56.	60	1,150	47	1,257	4.8	91.5	3.7
1956/57.	48	1,082	52	1,182	4.1	91.5	4.4
1957/58.	120	1,092	56	1,268	9.5	86.1	4.4
1958/59.	118	1,070	51	1,239	9.5	86.4	4.1
1959/60.	97	1,070	51	1,218	8.0	87.8	4.2
Average 1955/56- 1959/60	89	1,093	51	1,233	7.2	88.6	4.1
1960/61.	90	1,163	50	1,303	6.9	89.2	3.8
1961/62.	54	1,115	49	1,218	4.4	91.5	4.0
1962/63.	32	1,049	57	1,138	2.8	92.2	5.0
1963/64.	18	1,042	58	1,118	1.6	93.2	5.2
1964/65.	23	1,070	60	1,153	2.0	92.8	5.2
Average 1960/61- 1964/65	43	1,088	55	1,186	3.6	91.7	4.6
1965/66.	11	1,093	58	1,162	1.0	94.0	5.0

1/ Data for 1954/55 were not available in comparable form.

Source: (83).

Table B-9.--United Kingdom: Domestic utilization of wheat, 1954/55-1966/67

Year	Feed	Food	Other	Total	Share of total Feed	Share of total Food	Share of total Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	2,208	5,329	169	7,706	28.6	69.2	2.2
1955/56.	1,758	5,425	188	7,371	23.9	73.6	2.5
1956/57.	1,955	5,404	173	7,532	26.0	71.7	2.3
1957/58.	1,865	5,374	179	7,418	25.1	72.5	2.4
1958/59.	1,977	5,192	158	7,327	27.0	70.9	2.1
1959/60.	1,566	5,113	172	6,851	22.9	74.6	2.5
Average 1955/56-1959/60. . . .	1,824	5,302	174	7,300	25.0	72.6	2.4
1960/61.	1,681	5,345	163	7,189	23.4	74.3	2.3
1961/62.	1,482	5,036	185	6,703	22.1	75.1	2.8
1962/63.	2,294	5,167	163	7,624	30.1	67.8	2.1
1963/64.	1,811	5,121	181	7,113	25.5	72.0	2.5
1964/65.	2,417	5,089	205	7,711	31.3	66.0	2.7
Average 1960/61-1964/65	1,937	5,152	179	7,268	26.7	70.9	2.4
1965/66.	2,932	5,282	184	8,398	34.9	62.9	2.2
1966/67.	2,242	5,122	187	7,551	29.7	67.8	2.5

Source: (83)

Table B-10.--Spain: Domestic utilization of wheat, 1954/55-1963/64

Year	Feed	Food	Other	Total	Share of total Feed	Share of total Food	Share of total Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	-	3,662	511	4,173	-	87.8	12.2
1955/56.	-	3,631	514	4,145	-	87.6	12.4
1956/57.	174	3,929	517	4,620	3.8	85.0	11.2
1957/58.	5	3,689	524	4,218	.1	87.4	12.4
1958/59.	34	3,814	524	4,372	.8	87.2	12.0
1959/60.	30	4,093	530	4,653	.6	88.0	11.4
Average 1955/56-1959/60. . . .	49	3,831	522	4,402	1.1	87.0	11.9
1960/61.	-	4,212	538	4,750	-	88.7	11.3
1961/62.	-	4,101	466	4,567	-	89.8	10.2
1962/63.	5	4,442	510	4,957	.1	89.6	10.3
1963/64.	5	3,850	509	4,364	.1	88.2	11.7

Note: Dash indicates zero or negligible.

Source: (83)

Table B-11.--Greece: Domestic utilization of wheat, 1954/55-1963/64

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	10	1,366	193	1,569	.6	87.1	12.3
1955/56.	10	1,396	196	1,602	.6	87.1	12.2
1956/57.	15	1,512	198	1,725	.9	87.7	11.5
1957/58.	15	1,528	216	1,759	.8	86.9	12.3
1958/59.	20	1,547	221	1,788	1.1	86.5	12.4
1959/60.	20	1,552	225	1,797	1.1	86.4	12.5
Average 1955/56- 1959/60. . . .	16	1,507	211	1,734	.9	86.9	12.2
1960/61.	15	1,550	210	1,775	.8	87.3	11.8
1961/62.	-	1,523	211	1,734	-	87.8	12.2
1962/63.	20	1,469	216	1,705	1.2	86.2	12.7
1963/64.	20	1,422	181	1,623	1.2	87.6	11.2

Note: Dash indicates zero or negligible.

Source: (83)

Table B-12.--Sweden: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	138	537	100	775	17.8	69.3	12.9
1955/56.	120	527	106	753	15.9	70.0	14.1
1956/57.	54	522	94	670	8.1	77.9	14.0
1957/58.	155	523	79	757	20.5	69.1	10.4
1958/59.	130	540	93	763	17.0	70.8	12.2
1959/60.	133	501	97	731	18.2	68.5	13.3
Average 1955/56- 1959/60. . . .	118	523	94	735	16.0	71.2	12.8
1960/61.	119	508	80	707	16.8	71.9	11.3
1961/62.	130	518	89	737	17.6	70.3	12.1
1962/63.	157	510	73	740	21.2	68.9	9.8
1963/64.	121	505	73	699	17.3	72.2	10.4
1964/65.	176	498	86	760	23.2	65.5	11.3
Average 1960/61- 1964/65. . . .	141	508	80	729	19.3	69.7	11.0
1965/66.	170	511	75	756	22.5	67.6	9.9

Source (83)

Table B-13.--Portugal: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - - Percent - - - - - -		
1954/55.	-	697	83	780	-	89.4	10.6
1955/56.	-	561	80	641	-	87.5	12.5
1956/57.	-	641	80	721	-	88.9	11.1
1957/58.	-	648	84	732	-	88.5	11.5
1958/59.	-	629	85	714	-	88.1	11.9
1959/60.	3	621	82	706	.4	88.0	11.6
Average 1955/56- 1959/60. . . .	1	620	82	703	.1	88.2	11.7
1960/61.	-	676	65	741	-	91.2	8.8
1961/62.	-	635	82	717	-	88.6	11.4
1962/63.	-	668	82	750	-	89.1	10.9
1963/64.	-	717	77	794	-	90.3	9.7
1964/65.	-	675	76	751	-	89.9	10.1
Average 1960/61- 1964/65. . . .	-	674	77	751	-	89.7	10.3
1965/66.	-	764	57	821	-	93.1	6.9

Note: Dash indicates zero or negligible.

Source: (83)

Table B-14.--Switzerland: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - -		
1954/55.	161	515	36	712	22.6	72.3	5.1
1955/56.	88	522	42	652	13.5	80.1	6.4
1956/57.	146	552	35	733	19.9	75.3	4.8
1957/58.	69	552	36	657	10.5	84.0	5.5
1958/59.	123	511	36	670	18.4	76.3	5.4
1959/60.	106	547	38	691	15.3	79.2	5.5
Average 1955/56- 1959/60. . . .	106	537	38	681	15.6	78.8	5.6
1960/61.	91	563	39	693	13.1	81.2	5.6
1961/62.	87	597	38	722	12.0	82.7	5.3
1962/63.	139	535	38	712	19.5	75.1	5.3
1963/64.	86	575	34	695	12.4	82.7	4.9
1964/65.	121	533	39	693	17.5	76.9	5.6
Average 1960/61- 1964/65. . . .	105	561	37	703	14.9	79.8	5.3
1965/66.	193	562	36	791	24.4	71.0	4.6

Source: (83)

Table B-15.--Austria: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - Percent - - - - - -		
1954/55.	68	598	64	730	9.3	81.9	8.8
1955/56.	92	652	67	811	11.3	80.4	8.3
1956/57.	59	620	70	749	7.9	82.8	9.3
1957/58.	70	623	71	764	9.2	81.5	9.3
1958/59.	78	617	70	765	10.2	80.6	9.2
1959/60.	132	609	74	815	16.2	74.7	9.1
Average 1955/56- 1959/60. . . .	86	624	71	781	11.0	79.9	9.1
1960/61.	87	595	77	759	11.5	78.4	10.1
1961/62.	74	554	67	695	10.6	79.7	9.6
1962/63.	76	560	71	707	10.7	79.2	10.0
1963/64.	123	554	70	747	16.5	74.2	9.4
1964/65.	141	557	72	770	18.3	72.3	9.4
Average 1960/61- 1964/65. . . .	100	564	72	736	13.6	76.6	9.8
1965/66.	176	557	70	803	21.9	69.4	8.7

Source: (83)

Table B-16.--Ireland: Domestic utilization of wheat, 1954/55-1964/65

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - Percent - - - - - -		
1954/55.	-	456	147	603	-	75.6	24.4
1955/56.	-	467	92	559	-	83.5	16.5
1956/57.	-	410	118	528	-	77.7	22.3
1957/58.	30	442	118	590	5.1	74.9	20.0
1958/59.	96	437	86	619	15.5	70.6	13.9
1959/60.	213	417	60	690	30.9	60.4	8.7
Average 1955/56- 1959/60. . . .	68	435	94	597	11.4	72.9	15.7
1960/61.	45	400	77	522	8.6	76.6	14.8
1961/62.	132	392	75	599	22.0	65.4	12.5
1962/63.	95	386	79	560	17.0	68.9	14.1
1963/64.	142	379	47	568	25.0	66.7	8.3
1964/65.	78	366	44	488	16.0	75.0	9.0
Average 1960/61- 1964/65. . . .	98	385	64	547	17.9	70.4	11.7

Note: Dash indicates zero or negligible.

Source: (83)

Table B-17.--Denmark: Domestic utilization of wheat, 1954/55-1965/66

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	365	276	27	668	54.6	41.3	4.0
1955/56.	209	276	38	523	40.0	52.8	7.3
1956/57.	155	278	38	471	32.9	59.0	8.1
1957/58.	101	255	41	397	25.4	64.2	10.3
1958/59.	117	267	43	427	27.4	62.5	10.1
1959/60.	133	256	51	440	30.2	58.2	11.6
Average 1955/56- 1959/60. . . .	143	266	43	452	31.6	58.8	9.5
1960/61.	73	258	51	382	19.1	67.5	13.4
1961/62.	90	268	71	429	21.0	62.5	16.5
1962/63.	180	268	88	536	33.6	50.0	16.4
1963/64.	160	270	73	503	31.8	53.7	14.5
1964/65.	143	264	50	457	31.3	57.8	10.9
Average 1960/61- 1964/65. . . .	129	266	66	461	28.0	57.7	14.3
1965/66.	186	259	45	490	38.0	52.8	9.2

Source: (83)

Table B-18.--Norway: Domestic utilization of wheat, 1954/55-1966/67

Year	Feed	Food	Other	Total	Share of total		
					Feed	Food	Other
	- - - - - - - 1,000 metric tons - - - - - - -				- - - - - - - Percent - - - - - - -		
1954/55.	64	270	9	343	18.7	78.7	2.6
1955/56.	49	290	10	349	14.0	83.1	2.9
1956/57.	71	267	7	345	20.6	77.4	2.0
1957/58.	44	281	5	330	13.3	85.2	1.5
1958/59.	49	260	5	314	15.6	82.8	1.6
1959/60.	49	277	7	333	14.7	83.2	2.1
Average 1955/56- 1959/60. . . .	52	275	7	334	15.6	82.3	2.1
1960/61.	53	271	9	333	15.9	81.4	2.7
1961/62.	52	288	2	342	15.2	84.2	.6
1962/63.	67	285	15	367	18.2	77.7	4.1
1963/64.	60	280	2	342	17.5	81.9	.6
1964/65.	83	287	3	373	22.2	76.9	.8
Average 1960/61- 1964/65. . . .	63	282	6	351	17.9	80.3	1.7
1965/66.	82	286	4	372	22.0	76.9	1.1
1966/67.	75	294	4	373	20.1	78.8	1.1

Source: (83)

APPENDIX C

WORLD WHEAT TRADE

Table C-1.--Wheat flour: World exports by regions, 1955-1966

Country or region	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
						1,000 metric tons						
United States. . . .	944	993	1,177	1,383	1,305	1,766	1,771	1,830	1,868	1,659	1,280	1,403
Canada	730	1,116	618	749	707	670	606	561	634	1,095	757	970
Japan.	16	14	9	14	15	25	42	68	61	55	38	57
EC	584	702	697	1,001	753	1,035	926	918	786	950	1,115	954
EFTA	12	6	14	2	3	-	-	8	5	5	12	-
Other Western Europe	-	-	-	-	276	26	45	60	39	32	53	4
Australia, New Zealand & S. Africa, Rep. of	578	606	564	286	467	502	542	468	434	626	350	428
Eastern Europe . . .	-	-	-	-	-	-	-	-	13	21	-	-
USSR	-	-	-	-	-	-	-	-	9	7	204	289
Communist Asia . . .	-	-	-	-	-	-	-	-	-	-	5	2
Latin America. . . .	114	52	28	34	19	6	26	26	12	14	15	17
North Africa	100	88	91	105	75	80	44	12	36	17	13	8
West Africa.	-	-	-	-	-	-	-	20	-	8	-	24
East Africa.	-	-	-	-	-	-	-	-	9	-	-	-
West Asia.	-	-	-	-	-	-	-	3	12	3	3	-
South Asia	1	-	-	-	-	-	-	-	-	1	6	-
Southeast Asia . . .	-	-	-	-	-	-	-	-	1	-	-	-
Other East Asia. . .	-	-	-	-	-	8	23	17	26	45	44	20
Far East Asia & Oceania	-	-	-	219	1	3	-	-	1	23	45	40
World total. . .	3,079	3,577	3,198	3,793	3,621	4,121	4,025	3,991	3,946	4,561	3,940	4,216

Note: Dash indicates zero trade or trade of less than 500 metric tons.

Source: (71) updated.

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Table C-2.--Wheat flour: World imports by regions, 1955-1966

Country or region	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
	- - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - - - -											
United States. . . .	2	2	2	3	3	3	2	2	-	-	-	-
Canada	-	1	-	4	-	-	-	-	-	-	-	-
Japan.	32	46	57	58	70	76	77	74	75	39	5	-
EC	195	183	219	344	283	394	201	217	84	45	44	40
EFTA	393	411	398	457	462	485	454	472	358	313	286	241
Other Western Europe	12	15	32	42	45	59	46	26	39	46	54	20
Australia, New Zealand & S. Africa, Rep. of	-	-	-	-	-	-	-	-	-	-	-	-
Eastern Europe . . .	162	202	64	59	71	113	87	88	55	77	50	32
USSR	-	-	-	-	-	-	-	-	276	972	265	198
Communist Asia . . .	-	-	-	-	-	-	342	218	1	55	37	152
Latin America. . . .	848	934	736	756	586	546	508	592	575	678	899	992
North Africa	86	157	217	390	603	751	642	774	1,029	924	826	916
West Africa.	170	196	173	156	210	202	231	246	190	141	193	157
East Africa.	41	38	46	98	46	59	62	79	72	64	101	269
West Asia.	276	309	331	484	339	463	501	498	422	380	418	392
South Asia	220	192	210	213	277	275	253	189	142	319	222	283
Southeast Asia . . .	79	101	78	84	103	95	119	119	157	116	144	165
Other East Asia. . .	282	389	336	401	225	208	188	128	131	149	177	228
Far East Asia & Oceania	281	401	299	244	298	392	313	269	340	243	219	131
World total. . .	3,079	3,577	3,198	3,793	3,621	4,121	4,025	3,991	3,946	4,561	3,940	4,216

Note: Dash indicates zero trade or trade of less than 500 metric tons.

Source: (71) updated.

Table C-3.--Wheat and wheat flour: World trade in wheat equivalent, as percentage of total exports of each region, average 1964-66

Exporting regions	United States	Canada	Japan	EC	EFTA	OWE	Australia, N.Z., S. Afr., Rep. of	Europe (Communist)	USSR	Communist Asia	Latin America: North	Africa: North	Africa: West	Africa: East	Asia: West	Asia: South	Asia: South-east	Asia: Other	Far East & Oceania	Total world exports
United States	-	-	9.0	6.2	3.8	0.9	0.7	7.0	2.7	-	13.0	11.0	0.9	0.3	5.2	33.5	0.8	5.0	neg.	100.0
Canada	0.3	-	9.1	8.9	16.7	0.9	0.5	8.6	29.2	13.6	6.5	neg.	0.5	neg.	0.2	3.3	0.1	1.2	0.4	100.0
Japan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	49.3	43.5	100.0
EC	-	-	0.2	12.1	20.3	1.2	-	22.4	14.0	3.6	2.3	13.2	3.8	1.3	2.6	1.9	neg.	0.5	0.6	100.0
EFTA	-	-	-	17.8	24.6	1.0	-	54.2	-	-	-	-	-	1.0	-	0.2	-	1.2	-	100.0
Other Western Europe	-	-	-	25.0	36.4	-	-	-	-	-	-	32.6	-	-	6.0	-	-	-	-	100.0
Australia, N.Zealand & S. Afr., Rep. of	-	-	7.0	0.7	11.4	1.5	3.2	neg.	14.3	35.0	neg.	0.3	-	2.9	7.1	9.0	0.4	2.0	5.2	100.0
Total developed	neg.	-	7.6	7.2	10.9	1.0	0.8	8.9	13.5	8.8	8.0	6.6	1.0	0.7	3.6	17.1	0.4	3.0	0.9	100.0
Eastern Europe	-	-	-	1.8	-	1.2	-	5.9	66.3	-	5.9	13.6	-	-	-	5.3	-	-	-	100.0
USSR	-	-	-	-	-	1.0	-	74.2	-	2.1	20.5	2.1	-	-	-	0.1	-	-	-	100.0
Communist Asia	-	-	-	-	-	-	-	-	94.7	-	-	-	-	-	-	3.5	-	1.8	-	100.0
Latin America	-	-	neg.	15.8	5.8	1.0	0.2	4.1	14.7	25.6	30.8	1.1	neg.	0.2	0.6	0.1	-	neg.	-	100.0
North Africa	-	-	-	82.5	1.0	-	-	3.9	-	-	-	12.6	-	-	-	-	-	-	-	100.0
West Africa	-	-	-	6.3	-	6.3	-	-	-	-	-	-	6.2	81.2	-	-	-	-	-	100.0
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	100.0
West Asia	-	-	-	27.8	1.8	-	-	-	-	-	-	9.3	-	-	61.1	-	-	-	-	100.0
South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	100.0
Southeast Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other East Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	-	11.8	43.1	39.2	100.0
Far East Asia & Oceania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5	-	-	92.5	100.0
World total imports	neg.	-	6.5	7.8	9.9	1.0	0.7	11.1	13.2	10.0	10.5	5.9	0.9	0.6	3.2	14.8	0.4	2.6	0.9	100.0

Note: Dash indicates zero trade or trade of less than 500 metric tons.

Source: (71) updated.

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Table C-4.--Wheat: Special transactions of major exporting countries, 1959/60--1966/67

Country	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
					1,000 metric tons			
United States. . .	9,707	12,611	13,136	13,082	13,322	15,326	14,044	8,125
Canada	378	959	2,751	2,212	2,116	3,930	3,781	4,846
Australia. . . .	21	20	-	9	-	166	151	144
Argentina. . . .	100	-	-	-	-	-	-	5
Soviet Union . . .	-	-	-	1/1,003	1,018	1,730	2,789	5,310
Sweden	-	-	-	-	2	2	-	6
Italy.	-	-	-	-	-	-	41	15
France	30	-	-	-	-	-	-	-
Total.	10,236	13,590	15,887	16,306	16,458	21,154	20,806	18,451

Note: Dash indicates negligible or zero.

1/ Based largely on actual exports and not on reports of contracts.

Source: (61)

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Table C-5.--Wheat: Special purchases by region, 1959/60-1966/67

Country	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
				1,000 metric tons				
Japan.	37	7	3	3	-	-	-	-
EC	21	7	9	-	-	-	-	-
United Kingdom . .	34	55	32	-	-	-	-	-
Other Western Europe .	250	213	321	349	199	147	35	15
South Africa, Rep. of .	-	-	-	-	28	-	-	-
Eastern Europe . . .	1,171	1,864	1,852	2,490	2,825	4,293	4,100	4,315
Communist Asia . . .	-	215	2,217	1,536	1,240	1,881	2,327	2,962
Central America. . .	47	40	64	485	149	620	659	703
E. South America . .	1,140	1,339	1,258	1,219	1,104	966	271	531
W. South America . .	185	356	530	437	286	376	399	110
North Africa	1,226	1,919	2,631	2,295	2,166	2,103	1,958	1,649
West Africa.	34	58	87	142	74	96	156	156
East Africa.	2	5	2	25	14	14	53	36
West Asia.	474	1,098	2,124	932	713	883	981	236
South Asia	4,568	4,523	3,548	4,992	6,415	8,575	8,807	6,901
Southeast Asia . . .	85	121	92	121	107	160	218	203
E. Asia & Pacific. .	679	731	749	1,080	885	901	734	470
Other incl. unspec. .	1/7	1/53	1/11	-	-	1	1	1
UNICEF	-	-	-	24	-	-	-	-
UNWRA.	24	16	22	13	7	5	25	133
Total.	9,984	12,620	15,552	16,143	16,212	21,022	20,724	18,421

1/ Okinawa.   Note: Dash indicates zero or negligible.

Source: Table C-6.

Table C-6.--Wheat: Special purchases of major importing countries by region, 1959/60-1966/67

Country and region	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
				1,000 metric tons				
Japan.	37	7	3	3	-	-	-	-
EC								
Belgium-Lumenburg.	7	-	7	-	-	-	-	-
West Germany . . .	14	7	2	-	-	-	-	-
Total.	21	7	9	-	-	-	-	-
United Kingdom . . .	34	55	32	-	-	-	-	-
Other Western Europe								
Austria.	4	3	-	40	-	-	-	-
Finland.	-	-	-	229	-	-	-	-
Greece	39	102	76	56	92	47	13	-
Iceland.	9	7	9	7	9	6	7	4
Ireland.	173	-	-	-	-	-	-	-
Malta.	-	-	-	-	-	1	1	-
Norway	-	56	23	-	-	-	-	-
Portugal	25	45	213	17	98	93	14	11
Total.	250	213	321	349	199	147	35	15
South Africa, Rep. of	-	-	-	-	28	-	-	-
Eastern Europe								
Bulgaria	-	-	-	-	244	157	-	103
Czechoslovakia . .	-	304	-	120	429	1,107	1,053	1,310
Germany, East. . .	-	-	-	-	539	807	1,134	1,433
Hungary.	-	22	-	-	2	98	-	41
Poland	916	1,254	763	1,022	967	585	486	1,413
Romania.	-	-	-	-	30	169	-	-
Yugoslavia	254	282	1,088	1,346	613	1,369	1,426	15
Trieste.	1	2	1	2	1	1	1	-
Total.	1,171	1,864	1,852	2,490	2,825	4,293	4,100	4,315
Communist Asia								
China (Mainland) .	-	215	2,217	1,536	1,227	1,821	2,205	2,644
Mongolia	-	-	-	-	12	59	37	32
N. Korea	-	-	-	-	-	-	84	217
N. Vietnam	-	-	-	-	1	1	1	69
Total.	-	215	2,217	1,536	1,240	1,881	2,327	2,962
Central America								
British Honduras .	-	-	-	1	1	1	1	2
Cuba (Caribbean								
incl.).	17	-	-	468	85	566	612	667
Costa Rica	-	5	3	-	1	2	2	-
El Salvador. . . .	-	-	11	2	4	4	7	4
Guatemala.	3	-	1	1	6	3	4	4
Honduras, Rep. .	-	-	-	-	2	1	1	1
Nicaragua.	-	1	3	2	2	2	2	-
Trinidad & Tobago.	-	-	-	-	1	-	-	-
Dominican Republic	-	-	4	6	13	10	24	19
Haiti.	27	34	42	2	31	28	3	3
Jamaica.	-	-	-	3	3	3	3	3
Total.	47	40	64	485	149	620	659	703
East South America								
Brazil	838	1,337	1,169	1,164	1,065	920	260	484
Fr. Guiana	-	-	-	-	-	-	1	1
Guyana	-	-	-	-	-	-	-	-
Paraguay	1	2	88	52	25	33	2	40
Uruguay.	301	-	-	1	1	1	1	-
Venezuela.	-	-	1	2	13	12	7	6
Total.	1,140	1,339	1,258	1,219	1,104	966	271	531
West South America								
Bolivia.	7	50	85	125	121	106	115	41
Chile.	34	128	157	176	74	189	224	13
Colombia	81	93	109	68	22	52	34	38
Ecuador.	8	3	2	4	26	23	14	5
Peru	55	82	177	64	43	6	12	13
Total.	185	356	530	437	286	376	399	110

Continued --

Table C-6.--Wheat: Special purchases of major importing countries by region, 1959/60-1966/67 --Con.

Country and region	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
	- - - - - - - - - - - - - 1,000 metric tons - - - - - - - - - - - - -							
North Africa								
Algeria.	-	-	-	247	161	102	266	316
UAR.	1,105	1,579	1,852	1,528	1,711	1,414	1,371	607
Libya.	35	31	6	-	7	-	-	-
Morocco.	13	135	393	185	118	321	204	535
Sudan.	-	-	17	113	58	105	77	30
Tunisia.	73	174	363	222	111	161	40	161
Total.	1,226	1,919	2,631	2,295	2,166	2,103	1,958	1,649
West Africa								
Angola	-	-	-	-	-	-	13	-
Chad	-	-	-	-	-	2	2	2
Congo (Kinshasa) .	5	13	65	114	45	67	95	75
Congo (Brazzo.). .	-	-	-	-	-	-	-	-
Dahomey.	-	-	-	-	1	-	-	-
Gambia	-	-	-	-	-	-	1	-
Ghana.	27	24	4	1	2	1	20	55
Guinea, Rep. . .	-	6	7	23	20	18	16	-
Liberia.	2	3	1	1	1	1	1	1
Mali	-	-	-	-	-	-	5	15
Nigeria.	-	11	9	1	1	2	1	-
Senegal.	-	-	-	1	1	1	-	5
Sierra Leone . . .	-	-	-	1	2	4	2	2
Togo	-	1	1	-	-	-	-	-
Mauritania	-	-	-	-	1	-	-	1
Total.	34	58	87	142	74	96	156	156
East Africa								
Burundi.	-	-	-	1	2	-	2	-
Ethiopia	2	5	2	2	9	4	25	1
Kenya.	-	-	-	20	-	2	15	29
Malagassy (Madagascar). . .	-	-	-	1	1	1	1	1
Rwanda	-	-	-	-	-	-	4	5
Somalia (Somaliland). . .	-	-	-	-	-	4	1	-
Tanzania (Tanganyika). . .	-	-	-	1	2	3	5	-
Total.	2	5	2	25	14	14	53	36
West Asia								
Cyprus	-	-	30	-	21	-	1	-
Iran	5	289	120	203	95	280	190	40
Iraq	-	9	-	-	152	15	6	30
Israel	-	137	203	219	112	110	167	40
Jordan	54	159	74	88	130	71	81	91
Lebanon.	16	36	32	26	34	51	114	17
South Yemen. . . .	-	-	-	-	-	-	-	-
Syria Arab Rep. .	-	-	163	-	-	2	3	3
Turkey	390	457	1,495	392	169	352	419	14
Yemen.	9	11	7	3	-	2	-	1
Persian Gulf Ports	-	-	-	1	-	-	-	-
Total.	474	1,098	2,124	932	713	883	981	236
South Asia								
Afghanistan. . . .	-	56	15	-	111	72	142	78
Ceylon	30	123	69	114	45	63	126	73
India.	3,368	3,278	2,601	3,630	4,557	6,486	7,707	5,588
Nepal.	-	-	-	-	-	6	-	1
Pakistan	1,170	1,066	863	1,248	1,702	1,948	832	1,162
Total.	4,568	4,523	3,548	4,992	6,415	8,575	8,807	6,901
South-East Asia								
Burma.	7	10	-	-	4	9	4	-
Cambodia	9	24	14	-	-	2	-	-
Laos	-	-	-	3	3	5	2	2
South Vietnam. . .	68	87	78	119	100	144	212	200
Thailand	1	-	-	-	-	-	-	1
Total.	85	121	92	121	107	160	218	203

Continued --

Table C-6.--Wheat: Special purchases of major importing countries by region, 1959/60-1966/67 --Con.

Country and region	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
				1,000 metric tons				
East Asia and Pacific :								
China (Taiwan). . :	258	317	302	383	287	319	179	60
Hong Kong . . . . :	-	-	-	14	13	11	7	2
Indonesia . . . . :	104	6	108	95	8	6	18	16
Korea . . . . . . :	315	405	328	578	553	527	512	373
Malaysia (Malaya) :	-	1	1	1	6	4	2	9
Pacific Islands . :	-	-	-	-	-	-	-	-
Philippines . . . :	2	2	9	9	15	30	16	10
Singapore . . . . :	-	-	1	-	-	-	-	-
Macao . . . . . . :	-	-	-	-	3	4	-	-
Total . . . . . :	679	731	749	1,080	885	901	734	470

Note: Dash indicates zero or negligible.

Source: (61)

APPENDIX D

WHEAT PRICES

Table D-1.--Prices paid for imported (c.i.f.) wheats in the United Kingdom, 1956/57-1967/68

Year	Argentina 63-1/2 lbs. up river	Australian f.a.q. bulk	Canadian No. 2 Manitoba Northern, St. Lawrence	French Milling 76/78 kgs.	French Feed wheat 16-1/2% moisture	United States No. 2 Hard/Dark Winter 14% on sample, Gulf	United States No. 2 Soft Redwinter Atlantic
			-U.S. dollars per metric ton-				
1956/57	76.66	78.01	84.46	65.77	1/	80.26	77.35
1957/58	69.87	70.26	75.92	59.30	1/	71.58	69.14
1958/59	68.04	67.55	76.20	63.48	1/	72.22	65.50
1959/60	67.69	66.51	76.00	62.40	1/	71.43	64.29
1960/61	69.58	67.70	74.25	58.71	55.20	72.30	65.47
1961/62	72.31	70.72	78.01	65.31	1/	76.20	66.08
1962/63	68.81	69.04	76.82	59.13	1/	76.89	63.18
1963/64	75.39	74.66	80.48	64.39	2/ 58.86	79.24	69.78
1964/65	70.52	69.87	80.42	64.67	2/ 59.74	76.30	67.59
1965/66	70.38	72.39	81.87	65.27	59.87	3/ 73.08	67.72
1966/67	73.71	74.76	84.75	69.00	64.84	3/ 78.86	72.76
1967/68	71.26 4/5/	69.54	79.64	58.37	56.05	3/ 73.60	67.69

1/ Consistent series not available for the year. 2/ French feed wheat. Not denatured prior to 1964/65. 3/ With soft white and/or white club up to June 1968. 4/ Transshipment. 5/ All subsequent prices are for transshipment.

Source: (58).

Table D-2.--FAO import unit values for wheat, 1959-67

Region	1959	1960	1961	1962	1963	1964	1965	1966	1967	1964-66 weighted average
					- -U.S. dollars per metric ton- - -					
Major exporters:										
United States	57.90	60.40	60.90	62.90	70.80	73.90	74.90	74.20	76.40	74.30
Canada	100.00	100.00	100.00	100.00						
Argentina									72.90	
Australia & New Zealand. . .	55.30	56.30	56.50	60.20	71.70	72.40	72.30	68.20	72.60	71.10
Developed importers:										
Japan.	66.60	66.10	68.20	70.60	68.40	72.90	68.90	71.20	74.50	71.00
EC	68.30	68.60	72.30	78.80	75.70	78.30	76.90	79.50	82.30	78.20
United Kingdom	69.90	70.20	73.80	73.10	72.40	75.00	72.70	74.20	75.00	73.90
Other Western Europe . . .	71.20	72.30	73.10	74.60	74.50	74.40	69.40	71.60	75.00	71.60
South Africa, Rep. of. . .	62.10	62.60	59.80	72.20	69.10	71.00		63.90	68.10	65.40
Central plan countries:										
USSR	62.50	75.80	68.50	75.40	69.90	67.80	62.40	63.60	70.30	64.70
Eastern Europe	72.57	68.90	69.30	69.80	67.90	71.40	64.10	66.60	74.20	67.70
Communist Asia	76.70	74.80	73.50	75.70	75.30	79.40	75.30	74.80	75.70	76.40
Less developed:										
Central America & Caribbean.	83.90	83.10	69.10	73.20	72.40	78.00	75.70	73.10	77.50	75.50
East South America	71.00	69.00	72.90	72.80	75.70	78.00	70.90	70.00	72.60	73.20
West South America	75.50	77.40	78.80	80.60	77.00	87.00	77.50	63.80	75.20	74.00
North Africa	69.90	69.60	70.40	68.70	71.80	81.40	71.50	70.90	72.20	73.50
West Africa.	65.60	72.00	79.90	97.10	118.20	88.20	107.50	86.40	100.05	92.30
East Africa.	65.30	64.50	69.80	75.00	70.60	71.00	61.10	74.80	75.30	68.20
West Asia.	74.30	66.60	71.10	74.70	75.70	81.60	69.20	70.20	74.40	72.60
South Asia	80.70	76.30	78.80	80.20	75.10	80.50	73.30	75.00	78.10	76.00
Southeast Asia	78.60	79.60	98.40	78.20	71.40	87.60	89.10	81.00	77.00	84.00
East Asia & Pacific. . . .	72.50	69.20	71.10	72.30	73.30	81.30	72.90	74.40	72.70	76.90

Note: FAO import unit values were obtained by dividing import values by import quantities as given in respective FAO Trade Yearbooks and rounding to nearest 10 cents. Values are given in dollars so unit values are affected by exchange rates as well as rounding.

Table D-3.--FAO export unit values for wheat, 1959-67

Region	1959	1960	1961	1962	1963	1964	1965	1966	1967	1964-66 weighted average
				U.S. dollars per metric ton						
Major exporters:										
United States	63.20	62.20	65.20	66.60	65.70	66.20	60.10	62.10	64.10	62.90
Canada	64.30	63.80	65.40	69.90	68.00	69.70	65.60	67.50	72.10	67.70
Argentina	56.40	57.40	61.60	61.20	63.60	65.30	56.00	55.30	59.30	58.00
Australia & New Zealand	57.80	55.60	55.10	57.70	58.70	58.70	58.30	57.40	62.20	58.20
Developed importers:										
Japan	50.00	83.30	100.00	200.00						
EC	60.80	64.10	60.80	64.80	61.10	65.20	66.20	66.60	75.10	66.00
United Kingdom					68.90	64.70	88.20	88.90	72.00	75.50
Other Western Europe	56.30	62.50	55.60	61.00	56.00	58.10	56.30	57.80	64.80	57.40
South Africa, Rep. of	83.30									
Central plan countries:										
USSR	71.30	70.90	68.70	72.10	71.60	74.30	62.50	66.40	74.00	67.90
Eastern Europe	72.20	64.20	67.40	72.90	78.20	74.40	68.70	66.10	70.00	66.90
Communist Asia	73.00	73.20	72.90	75.90	80.00	76.70	62.40	63.50	64.30	73.30
Less developed:										
Central America & Caribbean	54.80			130.00	68.70	62.10	60.80	83.20	73.70	62.20
East South America				100.00	63.90		56.40	57.20		56.80
West South America										
North Africa	98.30	103.70	110.80	95.50	75.20	69.10	78.50	72.70		73.00
West Africa					150.00	32.90	66.67			34.60
East Africa				100.00	86.70	91.40	81.70			87.20
West Asia	60.40	72.70	101.10	92.20	65.00	65.10	87.10	88.80	112.40	72.20
South Asia	78.70	114.30	66.70	75.00	80.00		400.00	83.30		150.00
Southeast Asia		25.00	50.00		50.00					
East Asia & Pacfic	77.50	76.60	76.80	81.50	79.70	85.10	77.00	79.20	80.70	79.90

Note: FAO export unit values were obtained by dividing export values by export quantities as given in respective FAO Trade Yearbooks and rounding to nearest 10 cents. Values are given in dollars so unit values are affected by exchange rates as well as rounding.

Table D-4.--Canadian Wheat Prices

Crop year beginning August 1	No. 2 Manitoba Northern St. Lawrence, c.i.f. U.K. 4/	No. 2 Manitoba Northern Atlantic, c.i.f. Rotterdam 5/	No. 2 Manitoba Northern Japan c.i.f. landed 4/	No. 1 Manitoba Northern In store Ft. William/Port Arthur export 6/	No. 1 Manitoba Northern In store Vancouver export 6/	No. 1 Manitoba Northern Producer prices 7/	No. 1 Manitoba Northern Domestic and export price 8/	Support price Canadian $/bu. 1/	Support price U.S. $/bu.	Producer price Canadian $/bu. 2/	Producer price Canadian $/m.t.	Wheat Board selling quotation No. 2 Manitoba Northern Canadian $/bu. 3/	Wheat Board selling quotation No. 2 Manitoba Northern Canadian $/m.t.	Wheat Board selling quotation No. 2 Manitoba Northern Deflated Canadian 1962 $/m.t. 3/
			US $/m.t.											
1950/51	-	-	-	73.27	73.27	64.30	73.24	-	-	1.86	68.34	2.0905	76.97	81.88
1951/52	-	-	-	84.96	84.96	66.88	84.97	-	-	1.84	67.60	1.8025	66.23	69.72
1952/53	-	-	-	81.44	81.44	68.34	81.44	-	-	1.89	69.44	1.7887	65.72	69.18
1953/54	82.94	-	-	70.06	71.19	58.79	70.09	-	-	1.56	57.31	1.8175	66.77	69.55
1954/55	80.67	-	-	65.10	65.86	62.09	65.09	-	-	1.65	60.62	1.6887	62.04	64.63
1955/56	82.93	-	-	64.43	64.36	59.59	64.43	-	-	1.61	59.15	1.7050	62.64	64.58
1956/57	84.46	-	-	64.30	64.88	60.00	64.43	-	1.47	1.59	58.42	1.6487	60.57	62.44
1957/58	75.92	7/75.07	77.12	61.66	65.77	61.69	61.61	1.40	1.47	1.62	59.52	1.5837	58.19	60.61
1958/59	76.20	7/74.54	78.28	63.20	66.87	60.70	63.20	1.40	1.47	1.60	58.78	1.6300	59.89	61.74
1959/60	76.00	-	-	63.44	65.85	60.86	63.44	1.40	1.47	1.59	58.42	1.6262	59.75	60.97
1960/61	74.25	72.50	-	62.21	65.51	66.40	62.19	1.40	1.42	1.80	66.13	1.6337	60.02	61.24
1961/62	78.01	76.23	82.82	66.28	69.05	66.71	66.28	1.50	1.38	1.91	70.17	1.8800	69.07	69.77
1962/63	76.82	75.91	82.07	66.91	68.77	63.91	66.88	1.50	1.38	1.87	68.70	1.9525	71.73	71.73
1963/64	80.48	77.81	83.66	69.18	70.70	67.14	69.18	1.50	1.38	1.97	72.38	2.0037	73.62	72.18
1964/65	80.42	77.33	84.52	67.68	69.09	64.21	67.68	1.50	1.38	1.88	69.07	1.9537	71.78	69.02
1965/66	81.87	78.12	77.07	68.20	69.90	68.18	68.20	1.50	1.38	2.00	73.48	1.9675	72.29	67.56
1966/67	84.75	-	-	72.00	-	-	-	1.50	1.38	-	-	2.0875	76.69	69.09
1967/68	79.64	-	-	66.14	-	-	-	-	-	-	-	-	-	-

Note: Dash indicates data is not readily available in comparable form.

1/ Basic Producer Prices (61, generally table 19) "These prices are used as a basis for government guarantee to producers..." On Mar 1, 1962, the price was raised by Can. $0.10 to Can. $1.50 per bushel, retroactive to beginning of the Canadian marketing year (61).

2/ Converted to price per metric ton from Canadian Wheat Board total realized price per bushel, for No. 1 Northern wheat - basis in store Fort William/Port Arthur or Vancouver (15, Addenda, table XXI, p. 18).

3/ Canadian Wheat Board selling quotation; No. 2 Northern wheat in store Fort William/Port Arthur, converted to price per metric ton from price per bushel. (15, Addenda, table XXIV, P. 20, and Annual Report 1957-58 Addenda. Prices were deflated by IMF Cost of Living Index, 1958=100--converted to 1962 base = 100).

4/ Monthly weighted average landed prices at which the Food Agency purchased wheat in Japanese port warehouses from private importing firms; since 1965, basis c and f only (61, generally table 26b).

5/ (61, generally table 26a for United Kingdom and 26b for Rotterdam).

6/ In store prices, bulk wheat, yearly average computed from monthly average of daily prices quoted by the Canadian Wheat Board, converted by IWC to U.S. currency at IMF monthly rates of exchange (61, generally table 21).

7/ Final payments to farmers, No. 1 Manitoba Northern in bulk, in store Fort William/Port Arthur (61, generally table 18b).

8/ Domestic and export price, No. 1 Manitoba Northern in bulk in store Fort William/Port Arthur (6, generally table 18b).

Table D-5.--Producer prices for wheat in EC countries, 1954/55-1967/68 1/

Crop year	Belgium	Luxembourg	France	West Germany	Italy	Netherlands	Weighted average 2/
			—U.S. dollars per metric ton—				
1954/55	-	-	-	97.00	117.00	-	-
1955/56	-	-	-	99.00	109.00	-	-
1956/57	94.10	-	70.50	101.80	109.50	69.40	95.10
1957/58	94.10	-	67.20	104.30	108.00	75.30	88.10
1958/59	94.10	-	73.10	104.00	111.30	77.50	94.00
1959/60	94.40	-	73.50	104.30	104.00	81.90	89.70
1960/61	94.40	-	74.60	104.30	104.00	82.30	89.80
1961/62	94.10	-	82.30	108.40	104.00	84.90	95.10
1962/63	95.90	-	85.60	110.60	99.90	84.90	94.40
1963/64	97.40	-	86.70	110.60	98.10	93.00	95.70
1964/65	97.40	111.00	87.40	110.60	98.50	98.80	95.40
1965/66	97.40	111.00	88.90	106.60	98.10	98.10	94.80
1966/67	97.40	111.00	90.40	106.60	98.10	98.10	96.20
1967/68	97.40	93.70	91.90	94.40	95.20	98.10	93.70
			—Percent—				
Average annual rate of change 3/	0.5		2.9	0.5	-1.4	3.2	0.6

Note: Dash indicates data not readily available in comparable form.
1/ Initial month's intervention prices (wholesale) for Belgium and the Netherlands, for the areas of greatest surplus in France and Italy and for the deficit area in Fed. Rep. Germany. Prices increase on a seasonal scale to include storage costs and interest changes and refer to soft wheat of national quality standards prices to 1964/65 and to soft wheat of EC standard quality for 1964/65 and thereafter--16 percent moisture and 75 Kgs./hl. excepting Fed. Rep. Germany. 2/ Excludes Luxembourg from the weighted average. 3/ Simple percent, rate computed at the mean using least squares trend using years shown.

Source: Various issues (61), generally table 19, "Basic Producer Prices."

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Table D-6.--Producer prices for wheat in Other Western Europe Countries, 1956/57-1968/69

Crop year	Austria 1/	Finland 2/	Greece 3/	Ireland 4/	Norway 5/	Portugal 6/	Spain 7/	Sweden 8/	Switzer-land 9/	Weighted average
				- - - U.S. dollars per metric ton - - -						
1956/57.	96.30	131.20	90.40	80.90	121.60	104.70	70.90	78.30	148.10	82.70
1957/58.	96.30	140.70	90.40	80.90	121.60	104.70	117.90	78.30	152.50	107.40
1958/59.	96.30	147.00	91.10	83.40	125.70	105.10	119.80	79.00	156.20	109.50
1959/60.	95.90	159.50	90.00	83.00	125.70	107.30	84.10	90.80	155.40	92.60
1960/61.	96.30	163.90	87.40	83.40	126.00	108.00	84.50	90.80	155.40	96.70
1961/62.	95.20	156.20	90.00	82.70	140.00	108.00	92.60	87.10	155.40	98.10
1962/63.	95.20	156.20	90.00	82.70	141.80	108.00	92.60	98.10	160.20	98.80
1963/64.	95.20	168.60	107.70	82.70	141.80	108.00	102.50	102.50	158.40	107.20
1964/65.	95.20	187.40	111.70	82.70	144.00	108.00	111.00	106.20	158.40	114.10
1965/66.	95.20	187.40	98.50	86.00	148.40	114.60	111.00	108.00	157.60	112.30
1966/67.	95.20	187.40	98.50	97.00	152.50	114.60	116.50	111.00	157.60	114.20
1967/68.	95.20	187.40	86.70	97.00	156.90	114.60	116.50	106.20	157.60	112.80
1968/69.	95.20	149.90	86.70	83.00	156.90	114.60	99.60	98.50	157.60	102.20
				- - - - Percent - - - -						
Average annual rate of change 1958/59- 1966/67 10/.	1.5	3.0	1.7	1.2	2.6	0.9	2.1	3.9	0.2	1.9

1/ Average price paid for quality wheats including subsidy. Wheat passing a quality test receives premium.
2/ Price paid by the State Granary for f.a.q. winter and spring wheat f.o.r. on wagon during September. 3/ Average weighted price paid by the Central Service for Handling Domestic Produce for Government purchases of all Grade A Soft wheat--offered without time and quality limitations. A higher price is fixed for small farms. 4/ Price for wheat bushelling 61-62 lbs., delivered to growers nearest shipping point, or to purchasers premises. 5/ Price for wheat of 76.0/76.9 kgs./hl.; moisture 16.6 - 17.5 percent. 6/ Guaranteed price for durum wheat, including subsidy. 7/ Fixed price for ordinary bread wheat Class III, 77 kgs./hl., sold to the National Wheat Service. 8/ Redemption price at 1st April of following year for average quality wheat delivered at main ports. 9/ Price for millable winter wheat, Class I, 77-78 kgs./hl. prior to new wheat classification in 1965/66, Class I was Class II. 10/ Simple percent, rate computed at the mean using least squares trend.

Source: (61), generally table 19, "Basic Producer Prices".

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APPENDIX E

PRODUCTION TREND LINES

In projection work one is interested in past trends. For example: What levels would be reached if past trends continued through the projected period? What would happen if a different time period were used? Because of this interest and because the coefficients used in the production projections in this report were highly subjective, several simple linear time trend extrapolations of production were made. These extrapolations were compared with the projections given in chapter VII and with several other possible levels of production. Altogether, 10 levels were derived and are presented in table E-1 along with the level from the unbalanced world trade projections given in chapter VII. These figures tend to indicate that the projected levels for the unbalanced world trade projections and the world grain model are easily feasible and may even be conservative.

The 10 alternative levels for each region were derived in the following manner:

I   = the production trend for 1951-67 was extended to 1980.
IA = the area trend for 1951-67 was extended to 1980 and multiplied by the yield trend for 1951-67 extended to 1980.

II   = the production trend for 1955-67 was extended to 1980.
IIA = the area trend for 1955-67 was extended to 1980 and multiplied by the yield trend for 1955-57 extended to 1980.

III   = the production trend for 1959-67 was extended to 1980.
IIIA = the area trend for 1959-67 was extended to 1980 and multiplied by the yield trend for 1959-67 extended to 1980.

IV   = the unbalanced world trade projections as given in chapter VII.

V   = the average area for 1964-66 multiplied by the lowest 1980 trend extrapolation of yield for each region.

VI   = the average area for 1964-66 multiplied by the highest 1980 trend extrapolation of yield for each region.

VII   = the average area for 1964-66 multiplied by the highest yield achieved for each region between 1960 and 1967.

VIII   = the highest level of production achieved in each region between 1950 and 1969.

Table E-1.--Alternative world wheat production levels for 1980 by regions

Region	1951-1967 Production I	1951-1967 Area X yield IA	1955-1967 Production II	1955-1967 Area X yield IIA	1959-1967 Production III	1959-1967 Area X yield IIIA	Unbal. world trade proj. IV	Low 1980 yield V	High 1980 yield VI	High 1960-1967 yield VII	Highest production between 1950 & 1969 VIII	with year indicated VIII
					Million metric tons							
United States.	43.8	33.3	49.3	49.8	48.7	50.0	48.5	35.0	45.1	34.0	42.7	1968/69
Canada	19.3	19.3	26.1	26.9	33.4	38.6	23.3	16.9	26.7	22.2	22.5	1966/67
Argentina.	9.3	9.9	9.8	9.9	12.2	12.7	9.6	7.6	8.9	10.1	11.3	1964/65
Australia & New Zealand.	14.9	15.1	17.8	18.2	16.3	14.8	15.8	7.6	9.6	11.6	14.8	1968/69
Japan.	0.8	0.6	0.7	0.5	0.0	0.0	1.6	1.2	1.4	1.3	1.6	1962/63
EC	38.3	38.1	38.4	37.6	39.0	35.7	36.3	39.4	43.4	33.2	31.7	1968/69
United Kingdom	5.1	5.1	5.4	5.6	5.8	6.3	4.4	4.8	5.2	4.1	4.2	1965/66
Other Western Europe . .	13.3	13.3	13.3	12.9	14.3	13.7	12.8	13.2	15.3	12.0	11.8	1967/68
South Africa, Rep. of. .	1.1	1.0	0.9	0.8	0.9	0.8	1.0	0.4	0.6	0.8	1.2	1968/69
USSR	88.7	94.5	80.2	81.7	100.6	106.1	84.3	71.4	88.8	84.2	85.0	1966/67
Eastern Europe	29.3	29.2	33.3	33.1	35.3	36.2	29.8	29.7	35.1	25.1	25.1	1967/68
Communist Asia	25.1	24.9	19.6	19.3	24.1	23.6	32.0	23.0	25.8	25.0	25.5	1964/65
Central America & Caribbean.	3.3	4.0	3.1	4.0	3.4	3.1	3.2	3.2	3.7	2.2	2.1	1967/68
East South America . .	0.0	0.0	0.0	0.0	0.7	0.0	1.2	0.7	1.4	0.9	1.6	1/1955/56
West South America . .	1.9	1.9	1.8	1.8	1.6	1.4	1.9	2.0	2.2	1.7	1.7	1965/66
North Africa	4.5	4.5	4.2	4.2	4.3	4.3	7.2	4.3	4.4	5.2	5.3	1967/68
West Africa.	0.04	-	0.04	-	0.05	-	0.04	-	-	-	0.03	1967/68
East Africa.	0.7	-	0.8	-	0.9	-	0.8	-	-	-	0.6	1967/68
West Asia.	16.4	16.6	17.4	17.6	20.5	20.5	19.6	13.6	17.3	14.8	15.1	1967/68
South Asia	23.9	22.2	22.7	20.7	20.1	17.7	43.5	18.3	20.0	18.6	26.1	1968/69
Southeast Asia	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	1966/67
East Asia & Pacific. .	0.5	-	0.5	0.5	0.4	0.4	0.5	0.3	0.4	0.3	0.4	1967/68
World total.	340.6	333.6	345.5	345.3	382.7	386.2	377.2	292.7	355.4	307.4	330.5	

Note: Dash indicates data not available in comparable form. Extended trend values for 1980 are given in app. tables E-2, E-3, E-4.

1/ Data for peak year are questionable; actual production was probably lower.

Table E-2.--Regional wheat production trend lines for three time periods, extended to 1980

Production = a + b (Time)

Region	I 1/ 1951/52-1967/68		II 2/ 1955/56-1967/68		III 3/ 1959/60-1967/68		Average percentage change (b/mean production)			Extended to 1980		
	a value	b value	a value	b value	a value	b value	I	II	III	I	II	III
	-1,000 metric tons-		-1,000 metric tons-		-1,000 metric tons-		-Percent-			-1,000 metric tons-		
United States.	32,310	548	32,936	861	34,403	838	1.7	2.6	2.4	43,820	49,290	48,650
Canada.	14,904	222	14,841	591	15,742	1,036	1.5	4.0	6.6	19,560	26,060	33,360
Argentina.	6,424	136	6,584	167	6,745	322	2.1	2.5	4.8	9,290	9,750	12,220
Australia & New Zealand.	6,736	389	7,257	553	8,493	458	5.8	7.6	5.4	14,890	17,760	16,280
Japan.	1,352	-26	1,314	-34	1,292	-76	-1.9	-2.6	-5.9	815	670	-4
EC.	24,641	651	25,902	657	27,184	696	2.6	2.5	2.6	38,310	38,390	39,010
United Kingdom.	3,064	95	3,220	114	3,427	142	3.1	3.5	4.1	5,060	5,390	5,840
Other Western Europe.	9,359	186	9,709	188	9,994	252	2.0	1.9	2.5	13,260	13,280	14,270
South Africa, Rep. of.	753	14	796	6	812	8	1.9	0.8	1.0	1,050	917	940
USSR.	49,869	1,850	54,370	1,360	55,384	2,658	3.7	2.5	4.8	88,730	80,200	100,570
Eastern Europe.	16,900	592	17,800	813	19,368	934	3.5	4.6	4.8	29,350	33,250	35,250
Communist Asia.	21,706	161	22,462	-149	21,844	135	0.7	-0.7	0.6	25,080	19,630	24,140
Central America & Caribbean.	1,329	92	1,527	82	1,661	105	6.9	5.4	6.3	3,260	3,090	3,440
East South America.	953	-52	872	-74	662	2	-5.5	-8.5	0.3	-140	-540	690
West South America.	1,485	20	1,535	15	1,578	1	1.3	1.0	0.0	1,900	1,810	1,590
North Africa.	4,235	15	4,272	-6	4,250	5	0.4	-0.1	0.1	4,540	4,160	4,330
West Africa.	20	1	22	1	24	2	5.0	4.5	0.8	40	45	50
East Africa.	394	15	416	20	452	25	3.8	4.8	5.5	700	790	870
West Asia.	11,306	245	11,702	299	12,075	498	2.2	2.6	4.1	16,440	17,380	20,540
South Asia.	15,476	400	16,389	331	17,258	164	2.6	2.0	1.0	23,880	22,680	20,050
Southeast Asia.	27	4	32	7	42	10	14.8	21.9	23.8	110	170	210
East Asia & Pacific.	266	12	293	8	314	4	4.5	2.7	1.3	510	450	380
Total 4/.										340,595	345,162	382,680

1/ 1959/60 = 0. 2/ 1961/62 = 0. 3/ 1963/64 = 0. 4/ Total excludes all minus figures.

Source: Computed from data given in regional tables of app. A.

Table E-3.--Regional wheat area trend lines for three time periods, extended to 1980

[Area = a + b (Time)]

Region	I 1/ 1951/52-1967/68		II 2/ 1955/56-1967/68		III 3/ 1959/60-1967/68		Average percentage change (b/mean area)			Extended to 1980		
	a value	b value	a value	b value	a value	b value	I	II	III	I	II	III
	-1,000 hectares-		-1,000 hectares-		-1,000 hectares-		-Percent-			-1,000 hectares-		
United States	24,486	-459	22,723	95	22,716	354	-1.9	0.4	1.6	14,860	24,530	28,740
Canada	10,323	151	10,354	324	11,023	355	1.5	3.1	3.2	13,500	16,520	17,060
Argentina	4,742	49	4,757	81	4,750	232	1.0	1.7	4.9	5,780	6,300	8,690
Australia & New Zealand	5,569	312	5,952	465	6,906	474	5.6	7.8	6.9	12,110	14,780	14,970
Japan	600	-18	568	-21	539	-33	-3.0	-3.7	6.1	220	173	-15
EC	10,439	-17	10,440	-40	10,390	-100	-0.2	-0.4	-1.0	10,090	9,670	8,590
United Kingdom	874	3	868	8	870	22	0.3	0.9	2.5	930	1,020	1,240
Other Western Europe	7,148	-2	7,184	-31	7,135	-48	0.0	-0.4	0.6	7,110	6,600	6,320
South Africa, Rep. of	1,341	30	1,395	35	1,461	44	2.2	2.5	3.0	1,970	2,060	2,200
USSR	61,107	1,459	65,520	535	65,944	995	2.4	0.8	1.5	91,748	75,680	82,860
Eastern Europe	10,017	-5	10,009	-4	9,965	25	0.0	0.0	0.3	9,910	9,940	10,400
Communist Asia	25,495	-61	25,613	-244	24,978	-120	-0.2	-1.0	0.5	24,210	20,980	22,940
Central America & Caribbean	783	10	806	8	834	-10	1.3	1.0	-1.2	990	960	670
East South America	1,265	-66	1,215	-121	922	-71	-5.2	-10.0	-7.7	-130	-1,090	-285
West South America	1,253	-5	1,251	-9	1,253	-29	-0.4	-0.7	-2.3	1,150	1,080	760
North Africa	5,317	17	5,380	-10	5,357	-13	0.3	-0.2	-0.2	5,670	5,200	5,140
West Africa	-	-	-	-	-	-	-	-	-	-	-	-
East Africa	-	-	-	-	-	-	-	-	-	-	-	-
West Asia	11,195	167	11,657	72	11,734	145	1.5	0.6	1.2	14,710	13,020	14,200
South Asia	16,963	329	17,844	196	18,315	104	1.9	1.1	0.6	23,880	21,570	20,090
Southeast Asia	51	8	60	12	79	18	15.7	20.0	22.8	220	290	380
East Asia & Pacific	-	-	153	2	156	3	-	1.3	1.9	-	190	210
Total 4/										242,058	230,563	245,460

Note: Dash indicates data not available in comparable form.
1/ 1959/60 = 0. 2/ 1961/62 = 0. 3/ 1963/64 = 0. 4/ Total excludes all minus figures.

Source: Computed from data given in regional tables of app. A.

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Table E-4.--Regional wheat yield trend lines for three time periods, extended to 1980

Yield = a + b (Time)

Region	I 1/ 1951/52-1967/68 a value	b value	II 2/ 1955/56-1967/68 a value	b value	III 3/ 1959/60-1967/68 a value	b value	Average percentage change (b/mean yield) I	II	III	Extended to 1980 I	II	III
	-Kilos per hectare-						-Percent-			-Kilos per hectare-		
United States.	1,346	43	1,451	31	1,515	13	3.2	2.1	0.9	2,240	2,030	1,740
Canada	1,435	0	1,424	11	1,417	50	0.0	0.8	3.5	1,430	1,630	2,260
Argentina.	1,331	18	1,372	11	1,403	4	1.4	0.8	0.3	1,715	1,580	1,460
Australia & New Zealand. . . .	1,182	3	1,191	2	1,212	-13	0.3	0.2	-1.0	1,250	1,230	990
Japan.	2,278	29	2,331	31	2,412	16	1.3	1.3	0.7	2,880	2,910	2,680
EC	2,364	67	2,487	74	2,624	90	2.8	3.0	3.4	3,780	3,890	4,160
United Kingdom	3,500	95	3,697	93	3,925	66	2.7	2.5	1.7	5,500	5,460	5,050
Other Western Europe	1,309	27	1,353	32	1,400	45	2.1	2.4	3.2	1,870	1,960	2,170
South Africa, Rep. of.	562	-2	572	-10	556	-13	-0.4	-1.7	-2.3	520	380	340
USSR	809	11	827	13	836	26	1.4	1.6	3.1	1,030	1,080	1,280
Eastern Europe	1,687	60	1,779	82	1,937	91	3.6	4.6	4.7	2,950	3,330	3,480
Communist Asia	851	9	877	3	875	9	1.1	0.3	1.0	1,030	920	1,030
Central America & Caribbean. . .	1,640	113	1,848	124	2,067	149	6.9	6.7	7.2	4,010	4,210	4,600
East South America	758	3	733	20	745	57	0.4	2.7	7.7	830	1,110	1,710
West South America	1,189	21	1,231	22	1,265	31	1.8	1.8	2.5	1,630	1,650	1,790
North Africa	795	0	794	0	793	2	0.0	0.0	0.3	800	800	830
West Africa.	-	-	-	-	-	-	-	-	-	-	-	-
East Africa.	-	-	-	-	-	-	-	-	-	-	-	-
West Asia.	1,011	6	1,004	18	1,031	24	0.6	1.8	2.3	1,130	1,350	1,440
South Asia	782	7	794	9	820	4	0.9	1.1	0.5	930	960	880
Southeast Asia	511	0	508	4	507	18	0.0	0.8	3.6	510	585	810
East Asia & Pacific.	-	-	1,909	2	2,012	-13	-	0.1	-0.6	-	2,460	1,790

1/ 1959/60 = 0.   2/ 1961/62 = 0.   3/ 1963/64 = 0.

Source: Computed from data given in regional tables of app. A.